

# HP Professional

THE MAGAZINE FOR HEWLETT-PACKARD ENTERPRISE COMPUTING ▲ VOL. 7 NO. 2

FEBRUARY 1993

## STORAGE TECHNOLOGY

**UNIX Backup  
Solutions Protect  
And Defend Data On  
Multivendor LANs**

**CD-ING IS BELIEVING!**  
Optical Storage  
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**INDUSTRY WATCH**  
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(New Products, p.58)



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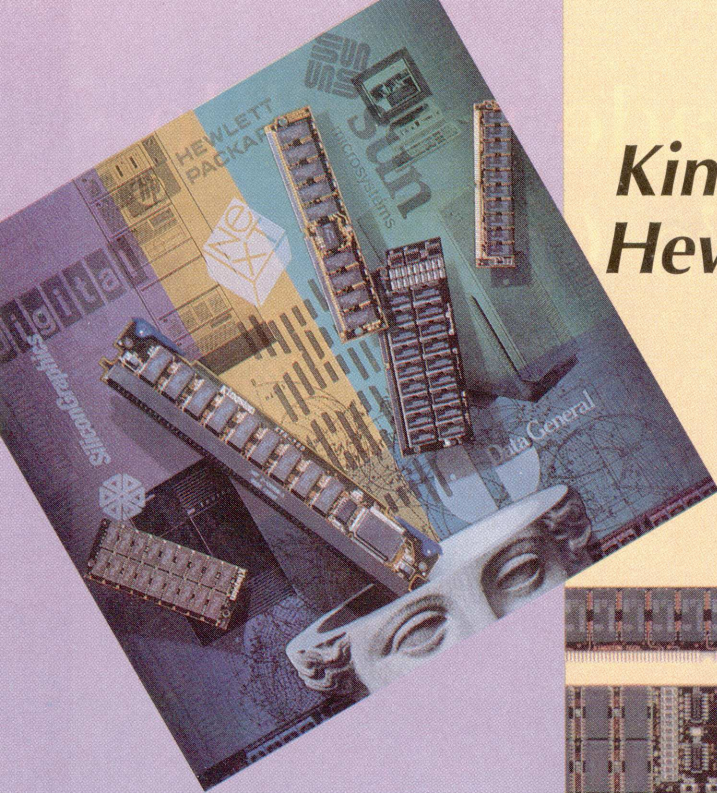
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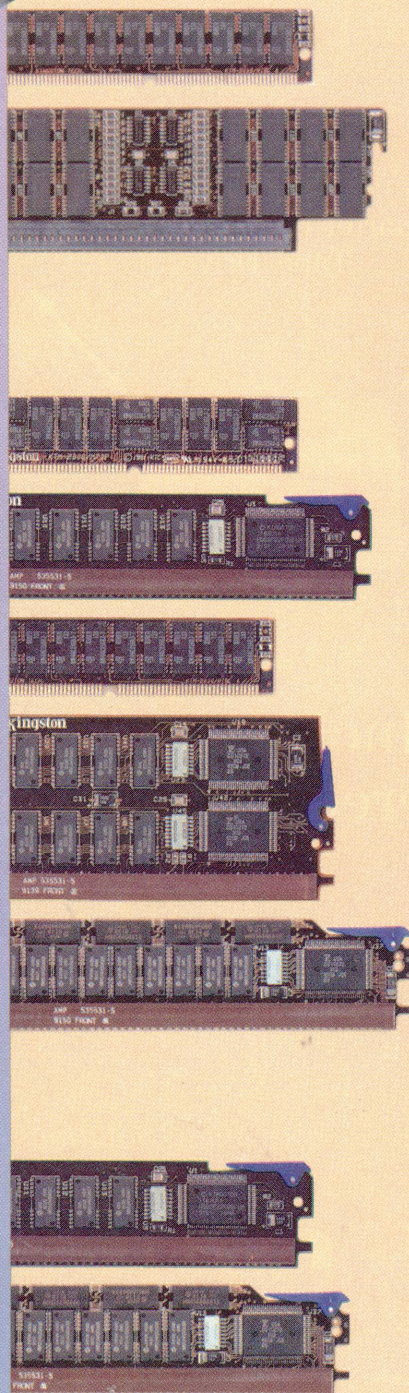
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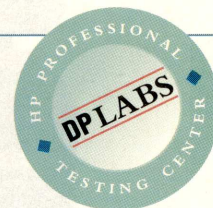
By Ron Levine

Thanks to breakthroughs in optical storage technology, system designers and application developers now have the storage capacity they need to break new ground in office automation, information retrieval and other application areas. In addition to being faster, cheaper and more flexible, optical storage media is a safer, more secure solution for sensitive mission-critical information.

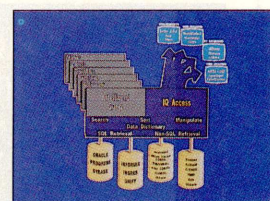
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HP-UX system managers in mixed UNIX environments must choose from countless backup and archiving solutions — all vying to protect and defend the mission-critical data now traveling on multivendor enterprise LANs. In addition to reliable performance, users also seek the ability to manage various storage devices, including DAT, 8mm and optical drives from a variety of UNIX platforms. Which solution is best for your environment?



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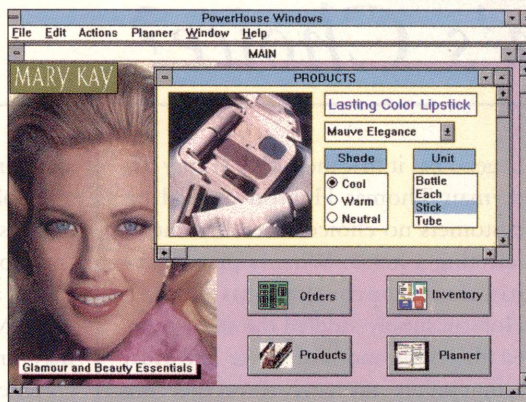


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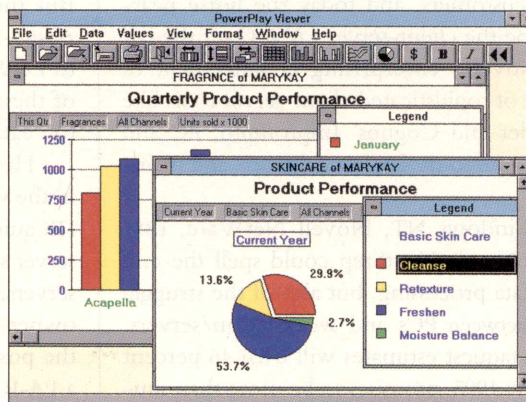
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# Hobson's Choice?



By Don Marks



Legend has it that the 17th Century liveryman Thomas Hobson offered his customers no choice when it came to selecting a horse. When a prospective itinerant approached his stables, Hobson simply saddled the steed nearest the door and sent horse and rider (often wildly mismatched) on their not so merry way.

You might say the computer industry does the same for its prospective customers, and today the horse nearest the door happens to be the client-server LAN. Over the last two years, thanks to Novell's enterprising enhancement of NetWare and the advent of sophisticated client-server tools like PowerSoft's PowerBuilder and Cognos' Impromptu, PC and workstation LANs have come to rival minicomputer- and mainframe-based solutions.

Indeed, Microsoft Windows NT, Novell NetWare, IBM OS/2 and possibly even Next's NextStep could spell the end not only of centralized data processing, but also of the struggle to define the difference between PCs and workstation/servers. Windows NT, which Dataquest estimates will own 46 percent of desktop market share by 1995, promises to be more than simply a "desktop" operating system. According to Bill Gates, it will incorporate the file and printsharing capabilities of Microsoft LAN Manager and provide a scalable server platform worthy of commercial computing applications. Novell's Ray Noorda apparently has similar plans for NetWare and/or UNIX.

## Horses Of Different Colors

Were this the best of all possible worlds, industry standards would usher in an era of multiplatform interoperability, in which the various server platforms would adopt a "clients-of-choice" strategy, supporting multiple operating system "personalities" and leaving the choice of client environment up to individual users. Unfortunately, however, a dystopic scenario is equally plausible. In a pitched battle for the enterprise, Microsoft, Novell and others could compete viciously—in much the same way Microsoft, Borland and Lotus (among others) now war over the PC application market. The result of such a conflict at the operating system level would be a chaos far more frustrating—and, ultimately, more expensive—than any glass-house bureaucracy has ever been.

There's little doubt the industry is headed toward multiplatform client-server operating systems. Digital, either in

spite or because of its financial difficulties, will bring to market an Alpha NT server later this year. And DEC's mail-order PC business promises to deliver plenty of Intel NT desktop clients (no doubt hoping its hardware volume benefits from NT's hearty appetite for memory and storage).

IBM, now staring into the vortex of its own financial ruin, may find itself pursuing a similar operating system strategy in commercial markets. OS/2, now sporting OSF/DCE and, hence, the potential to support Transarc's Encina distributed transaction processing monitor, could play a more important role in IBM's enterprise computing future than previously suspected. But the Taligent object-oriented operating system from the Apple-IBM joint venture and the possibility of porting OS/2 to POWER RISC still muddle Big Blue's OS plans. Will either of these operating systems ever interoperate with AIX? It's far too early to tell.

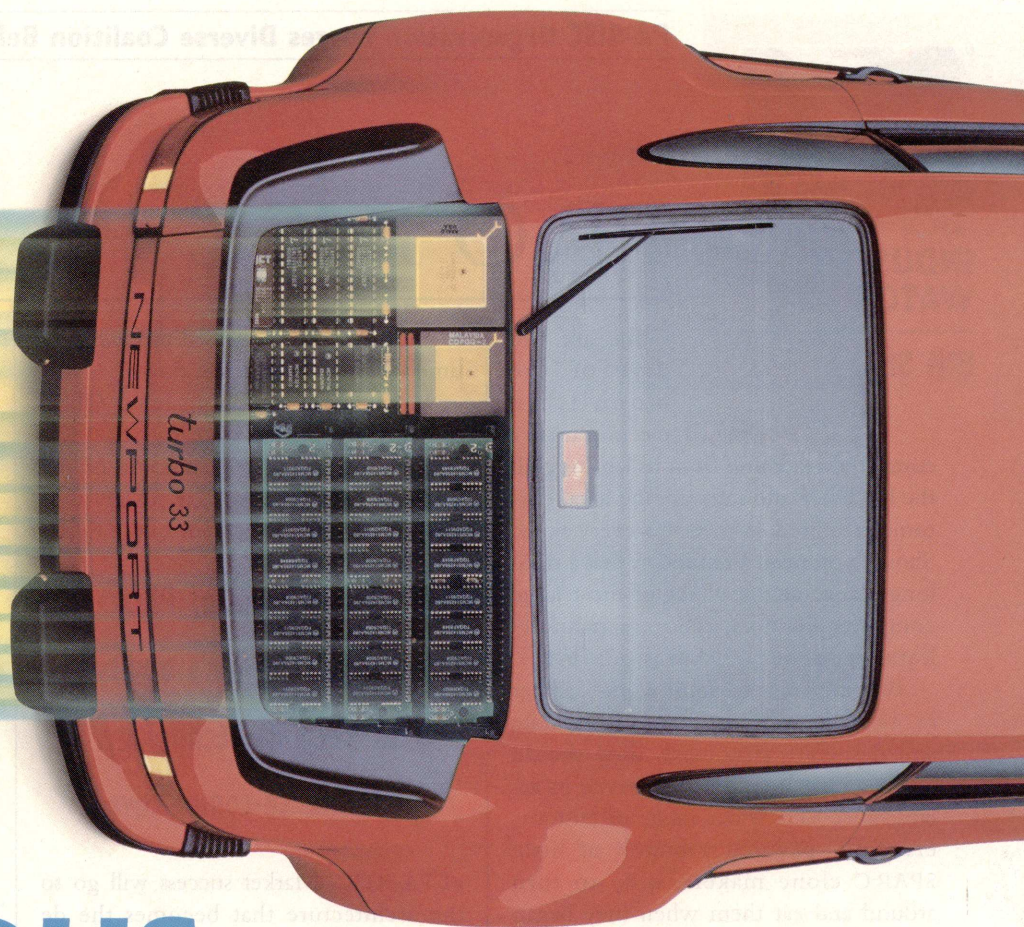
Hewlett-Packard, for its part, appears to be waiting cagily in the wings. While its competitors thrash about on center stage, HP quietly plans to roll out its PA-RISC-based Native NetWare server sometime mid-year. And, as the leading vendor of UNIX servers, HP clearly shares other interests with the proud new owner of UNIX Systems Labs. Yet HP still hasn't relinquished the possibility of striking a deal with Microsoft and delivering a PA-RISC-based NT server. And, as if calculating to create an impenetrable operating system smoke screen, HP last month held talks with Next about the possibility of moving NextStep to PA-RISC.

It would certainly make for some intriguing marketing arrangements were HP to become a hardware gun for hire. What's most unclear, however, is where HP-UX would fit in such a strategy. In a recent *BusinessWeek* article concerning the Novell-USL deal, HP's Wim Roelandts is quoted as saying the chances for UNIX to "take off" in commercial markets "have never been better." And Dataquest's recent projections give second place in that 1995 "desktop" market to UNIX at 30 percent; NetWare doesn't even show.

It seems as though the industry once again is offering customers Hobson's choice: Move to client-server networks populated with PCs and low-cost RISC servers. Why? Because that's what's next (no pun intended), and it will get you where you want to go — albeit not necessarily in the most convenient fashion. But perhaps we're actually being treated to a postmodern variation on the old liveryman's no frills approach: We take whatever horse we're offered, but this time we don't have the luxury of knowing which horse that is, or whether it's a horse at all.



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## INDUSTRY WATCH

Bill Sharp

# PRO RISC

Gone are the days of the monolithic computer

company, spawning from its lab-loins all the hardware and software the loyal customer required to meet his every need. Should you need a reminder, cast a side-long glance at the plight of most large computer vendors, who are painfully learning that no company is an island.

But, if companies must work together to meet the various needs of disparate and desperate customers, how should they do this? In effort to promote its architecture to a wider range of customers, Sun spawned a bunch of little SPARC clone makers, only to turn around and eat them when they began to compete for the mother company's market share. DEC's ACE consortium grew noisily and quickly, then fell apart just as fast.

### PROMoting PA-RISC

One year ago, in seeming response to Sun and DEC, the Precision RISC Organization (PRO) was organized. PRO seeks to build a world-wide group of complementary partners working together to make the most out of HP's PA-RISC technology.

The ultimate success of PRO depends on HP's ability to keep its technology performance-competitive and on the company's ability to maintain its and its partners marketing prowess as they seek to gain a larger share of the RISC market. Tom Black, marketing director for PRO, feels strongly that users will benefit.

"It's clear that no one company in the computer business can offer the entire set of solutions that the industry requires," says Black. As PRO progresses, he says, users will find a broader range of hardware and software solutions from which

to choose. And, increased product volume will help keep prices down.

Y. Sakamaki, of Tokyo-based Oki is the firm's representative on the PRO council. He suggests that some of the member firms less familiar to HP users may be critically important to the future

The success of PRO  
depends on HP's ability  
to keep its technology  
performance-competitive...

of PA-RISC. Market success will go to the architecture that becomes the de facto standard, Sakamaki says. "The number of processors used in computer systems is smaller than the number of processors used as embedded controllers," Sakamaki says. "The quantity of devices sold will determine which is the de facto standard. The number of microcontroller units will define the standard, rather than the number of microprocessors."

### PRO Family Values

Whether you buy into this logic or not, large quantities of PA-RISC chips may find their way into automobile engine compartments or high-quality printers in the coming months. Even if you don't need a compatible hard-wired link from your new 715/33 down to the humble Honda in the garage, that controller may help keep hardware affordable and software more available.

Sakamaki indicates that while there are only a few PRO vendors, they are all big companies — high-rollers in a high-tech business. "As [a] semiconductor manufacturer, Oki will have a big chance to be a supplier to these big companies," he says, and that translates into plenty of

mutually profitable back-scratching between PRO members.

The PRO vendor family presently includes:

■ **Convex** — markets HP Series 700 clusters and is developing PA-RISC-based massively parallel supercomputers.

■ **Hitachi** — markets PA-RISC-based workstations in Japan, and sells its own PA-RISC microcontroller chips worldwide.

■ **Hughes** — markets "hardened" versions of HP workstations for military applications, particularly shielding for RFI emissions.

■ **Mitsubishi Electric Company** — markets HP workstations under its own label.

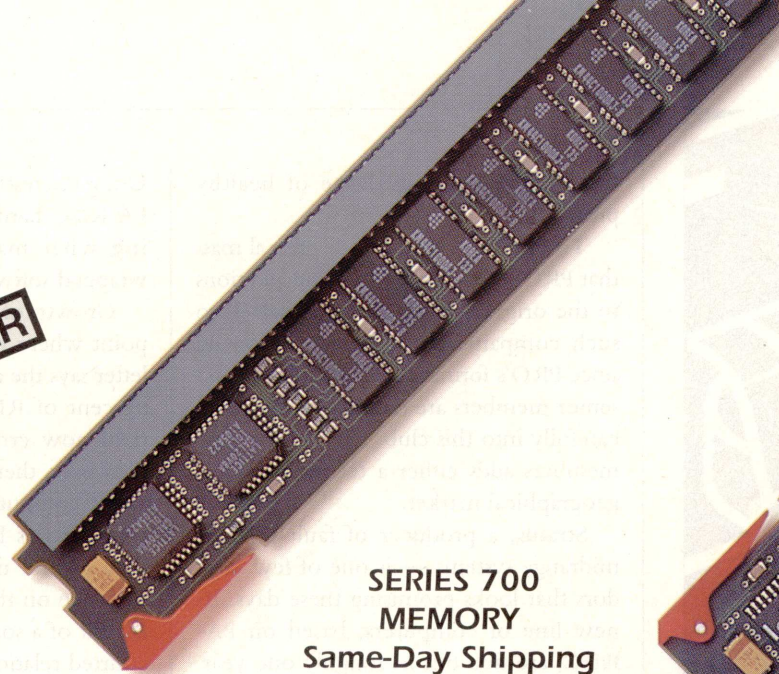
■ **Oki** — markets complete systems as well as its microcontroller chips for automotive and printer applications. The company also cooperates with competitor Hitachi to ensure that both firm's chips are compatible, offering customers a broader, effective family of controller products.

■ **Sequoia** — markets fault-tolerant systems, and is developing PA-RISC versions of its products.

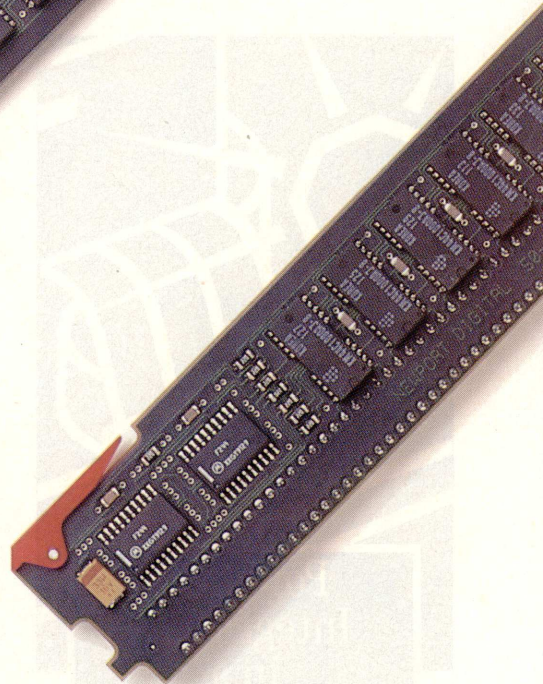
■ **Yokagawa** — markets systems for factory realtime process control.

The base strategy is pretty simple. By banding together and avoiding too much direct competition, these firms garner more attention for PA-RISC, benefit from a far larger pool of research and development than any one alone could put up, and hopefully gain some significant advantage over competing firms in their respective markets. The size of the market, in turn, draws more software developers to the fold, which creates an increase in hardware demand. The idea is to create some of the unbridled growth of the PC industry of the '80s while preventing the kind of unfettered competi-





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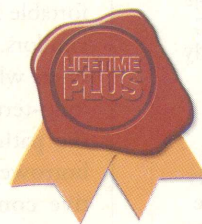
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tion that devours all hope of healthy profit.

To reach the world-wide critical mass that PRO seeks, however, some additions to the original group are essential. Two such companies have been announced since PRO's formation. New sponsor and senior members are recruited slowly and carefully into this club. Each of the new members adds either a technology or a geographical market.

Stratus, a producer of fault-tolerant midrange systems — is one of few vendors that looks promising these days. Its new line of computers, based on PA-RISC, are due out in roughly one year. The other inductee is Winbond, a Taiwan semiconductor manufacturer that will give PA-RISC entry to that country's powerful computer manufacturing base. Both firms add measurably to the reach of PRO.

### PRO Growth Agenda

PRO's intentions extend to more than just hardware. PRO wants to make comfortable homes not only for its hardware vendors, but also for the software developers who are every bit as crucial to the long-term health of PA-RISC. To speed the pathway to reliable software, PRO borrowed from the efforts of a competitive consortium, 88open, which helps further efforts of vendors developing products based on Motorola's 88000 RISC technology.

While 88open has not been a wild success in expanding the 88000 market, it did develop an excellent hardware and operating system test (AVS/88) and application test (ACT/88). PRO will port both 88open technologies to HP-UX.

Using the tests, PRO plans to certify both PA-RISC hardware and software, creating what may amount to a shrink-wrapped software market.

Growth of PA-RISC has reached the point where RISC Management Newsletter says the architecture holds about 25 percent of RISC market revenues in a field now crowded with competition. However, there is a significant gap in the world computer coverage of PRO—Europe. PRO's Black is quick to mention that several members have substantial presence on the continent, but the issue is a bit of a sore spot. Both IBM and HP courted relationships with Bull; IBM got the deal. Digital, meanwhile, wooed Olivetti away with the promise of its new Alpha architecture.

Relatively few large computer vendors make their home in Europe, and the most logical direction for PRO's attentions is toward ICL, the very acquisitive firm that expanded rapidly throughout Europe and in turn acquired by Fujitsu. Official word on such negotiations from Black is: "No comment." When pressed on the possibility of negotiations between PRO and ICL parent firm Fujitsu, Black offered: "No comment." Our comment: Keep your eye on ICL and Fujitsu; PRO still wants to grow.

You also can expect more from other PRO members. PA-RISC products from these vendors barely have started to appear, says Black. All have "significant product plans, and we will see much more significant roll-outs in the next year or two," he says.

Get ready to plug in the Honda, honey.

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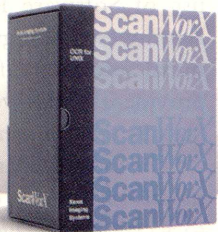
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## A Four Star GENERAL

DBGENERAL VERSION 6.1      BRADMARK TECHNOLOGIES, INC (c) BRADMARK 1984,1991

<b>1 INTERNAL STRUCTURE</b>	<b>2 DIAGNOSTICS w/RECOVERY</b>	<b>3 SET MAINTENANCE</b>
1.1 List user classes	2.1 Analyze master(s)	3.1 Setup cap mgr
1.2 List items, usage	2.2 Analyze syn chains	3.2 > Activate cap mgr
1.3 List set-items	2.3 > Analyze detail(s)	3.3 > Change master cap
1.4 List sets, paths	2.4 Analyze path(s)	3.4 Sample master cap
1.5 Regenerate schema	2.5 > Analyze/fix path(s)	3.5 > Change detail cap
	2.6 Global diagnostics	3.6 > Reorganize detail
<b>4 GENERAL UTILITIES</b>	<b>5 STRUCTURAL CHANGES</b>	<b>6 TEST BASE GENERATOR</b>
4.1 > Store/Restore	5.1 Setup user classes	6.1 Build new base
4.2 > Rename base/set(s)	5.2 Setup items	6.2 Copy to/from tape
4.3 > Purge base/set(s)	5.3 Setup sets	6.3 Copy to/from file
4.4 > Erase base/set(s)	5.4 Setup set-items	6.4 Copy by key(s)
4.5 > Move/Re-extend set	5.5 Setup paths	6.5 General functions
4.6 > Copy base/set(s)	5.6 Activate changes	
4.7 > Reblock set		
<b>7 STORBASE MODULE</b>	<b>8 SUPPLEMENTARY</b>	> Exclusive access
7.1 > Store base(s)	8.1 Modify key value	
7.2 > Restore base(s)	8.2 -- DBAUDIT --	

Option selected (H / ? / MPE / Menu / End) : █

Bradmark  
Technologies'  
DBGENERAL  
Stands Strong As  
An IMAGE  
Database Toolkit

Bradmark Technologies' flagship product DBGENERAL has continued to grow in functionality through the conversion from IMAGE to TurboIMAGE to TurboIMAGE/iX and on to IMAGE/SQL. In fact, Bradmark claims that DBGENERAL is "the most complete, single-product utility available, containing all functions needed to manage" IMAGE databases. And who's to argue?

Release 6.2 of DBGENERAL continues the transition to Native Mode (NM), increases functionality, adds usability features, and increases the performance of several modules.

The full DBGENERAL product consists of more than 35 modules, which allow for everything from reporting on database structure to diagnosis and automatic correction of problems; from general housekeeping chores, such as capacity changes or field

adds, to the creation and population of test databases.

Performance is always a fundamental issue when evaluating IMAGE tool software. Bradmark continues to improve DBGENERAL performance by increasing the raw speed of several modules and by adding progress feedback to several of the longer running modules.

Other highlights of the new release include:

- Master Capacity Change (option 3.5), already Native Mode since version 6.1, now offers a new "2nd-generation" NM-aware algorithm. This increases the speed of processing primary entries by four to five times and secondaries by two times.

- Detail Capacity Change (option 3.5) has been converted to NM and boasts two to five times the performance of the Compatibility Mode (CM) version.

- The NM versions of the longer running modules now provide progress reporting. Accumulated wall time, estimated remaining wall time and transaction rate are displayed.

Option 2.7 now performs NM diagnostics and repairs on detail datasets. In one pass through the dataset, DBGENERAL detects and records most structure problems. DBGENERAL informs the user of any problems and proceeds to fix them.

Section 6 has been expanded to include a new feature, option 6.6, Populate Test Databases. This NM module builds a test database

from a production database by copying all information RELATED to the selected records. Option 6.6 makes use of Software Research Northwest's Wingspan terminal interface software to provide a windowed, user-friendly environment.

The capacity management modules have been enhanced to accept percentage free responses to the "new capacity" prompt. DBGENERAL then calculates the new capacity based upon the current number of entries and the desired amount of free space.

In Section 8, Modify Key Value has been replaced by the latest NM version of DBKEYCHANGE, formerly a separate product. This is only for MPE/iX customers, and this feature now becomes part of the standard package. Also in Section 8, DBAudit has been enhanced to handle the new TurboIMAGE intrinsics related to dynamic rollback recovery.

Finally, many of the modules have been enhanced to accommodate TurboIMAGE/iX and its support for IEEE data types and expanded dataset sizes. Price for DBGENERAL ranges from \$2,000 to \$15,000 depending on configuration and system.

—John Burke, HP 3000 Editor

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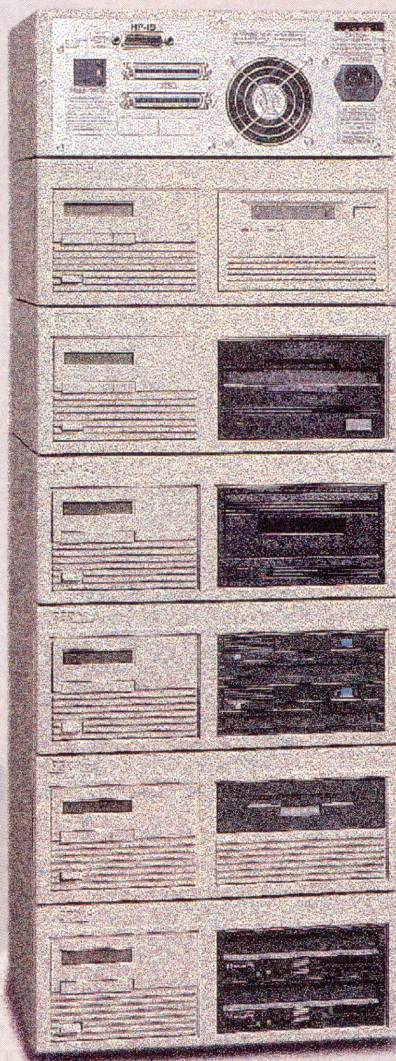
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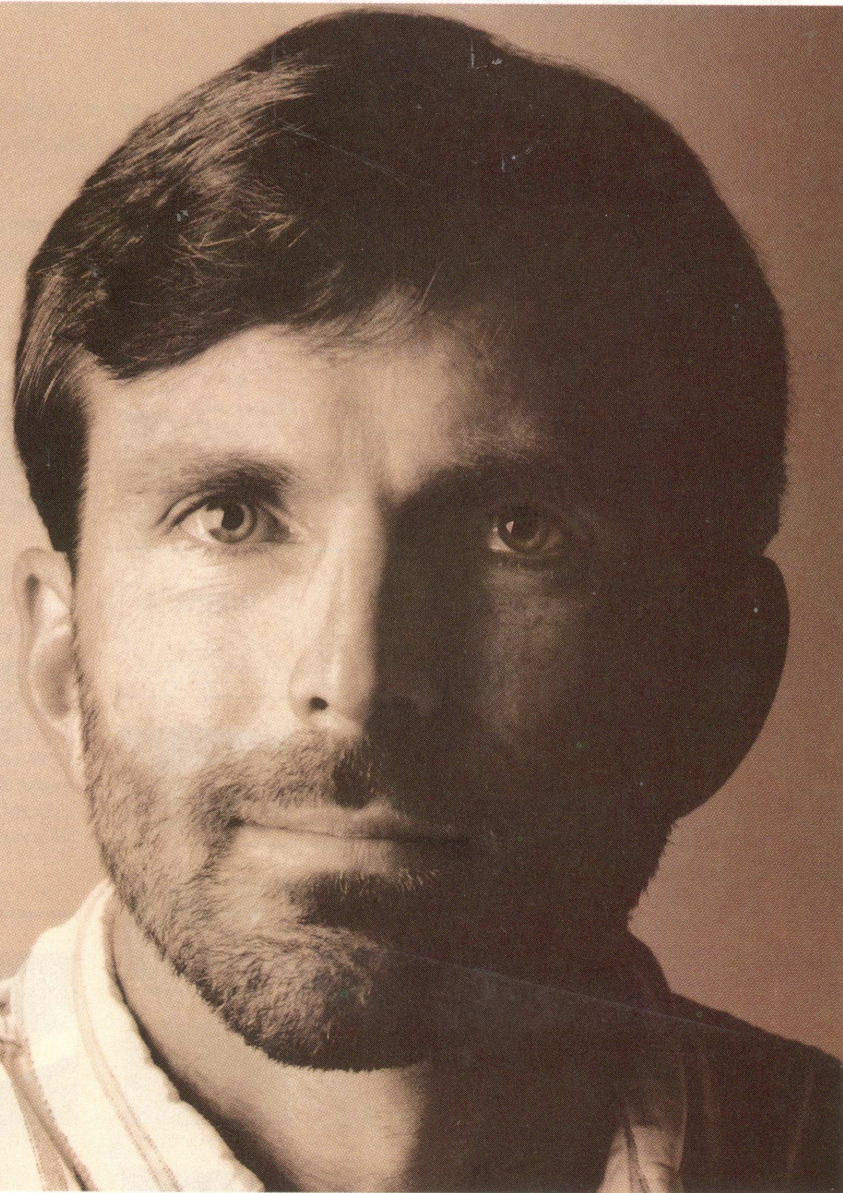
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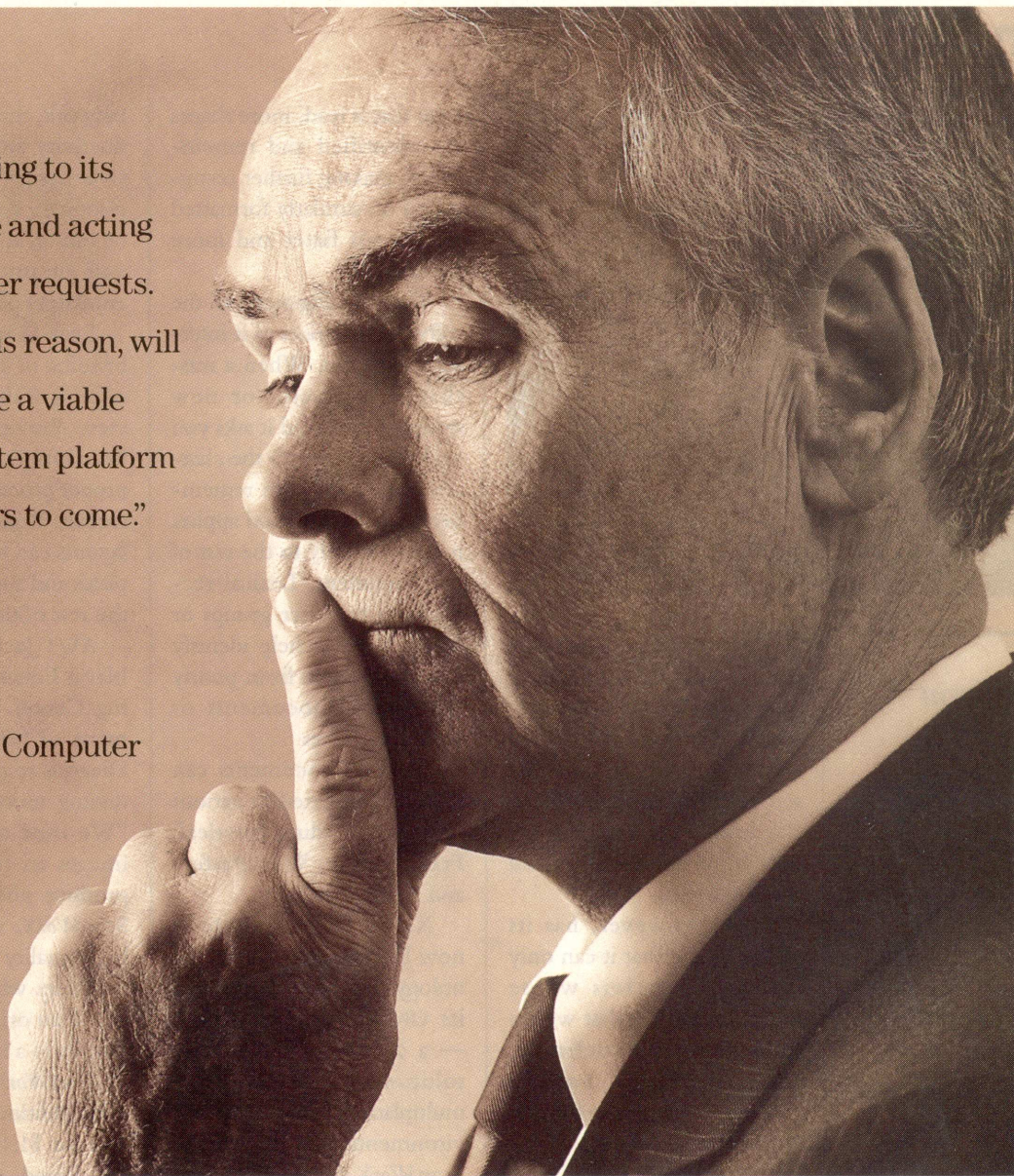
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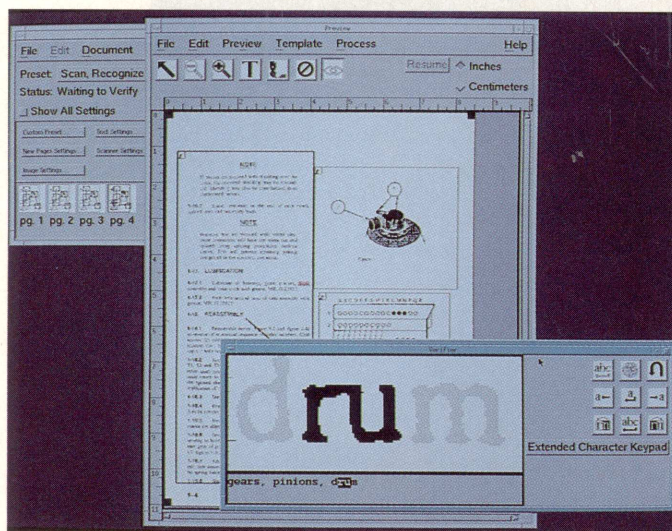
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## Advanced Reading



*XIS' "Intelligent"*

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*Learns New Fonts*

*And Typefaces*

*To Comprehend*

*Your Complex*

*Documents*

**D**o you cringe at the idea of manually rekeying documents for on-line reference? Scanners and optical character recognition (OCR) software, which interprets the characters read by the scanner, have helped eliminate this drudgery.

OCR, however, has its limitations in that it can only identify characters whose typeface matches that within its memory. And, unless the document print is "clean" — without broken or deformed characters — OCR's accuracy is diminished.

Xerox Imaging Systems' Intelligent Character Recognition (ICR), however, has expanded the recognition capabilities to "learn" characters based on their shape rather than matching them with a predefined font. This allows ICR software to read a range of fonts and typesstyles including dot-matrix, laser printer, fax copy or photocopy reproduction. For each

page that is read, more shapes are identified and remembered, making further recognition on similarly formatted documents faster and more accurate.

The "intelligence" of the software increases as it interacts with you. When a misshapen character or new symbol is first read it asks you to define and verify the character. The software remembers its definition and applies it automatically to the rest of the document. Lexical recognition by letter groups or words also can help identify and process text from poorly reproduced documents or mixed typefaces.

Scanned documents can then be converted to various formats including Interleaf, FrameMaker, WordPerfect and ASCII formats.

Xerox Imaging Systems now has taken its ICR technology one step further with its UNIX-based ScanWorX — a document recognition solution for client-server, multiplatform networked environments. XIS now offers ScanWorX for the HP 9000 Series 700 PA-RISC-based workstation; the product is already available on Sun OS and IBM AIX platforms.

ScanWorX' client-server architecture allows you to support multiple clients from one or more heterogeneous servers and enables you to operate across multiple platforms within one network. You can separate and share the processing requirements of input, recognition and format conversion across your

network, thus increasing productivity and making effective use of your network resources. ScanWorX also can be run on X Windows terminals or under X Window emulators on your PC.

ScanWorX adds to the benefits of ICR software by offering features such as Preview. Preview identifies text from images and indicates the proper processing and output format. Pages with repetitive layouts can be stored as templates and applied throughout the rest of the document.

AW1 Jack Staats of the Naval Education and Training Center Pacific, Department of NAVSTAD in San Diego is responsible for producing training documents. "We used to cut and paste images to text layouts and produce photocopies. With ScanWorX, we can produce high-quality documents, often times with better resolution than original documents output to a laser printer."

ScanWorX sells for \$1,995, with additional licenses available for \$1,450 each. — *Andrea Zavod, Associate Editor*

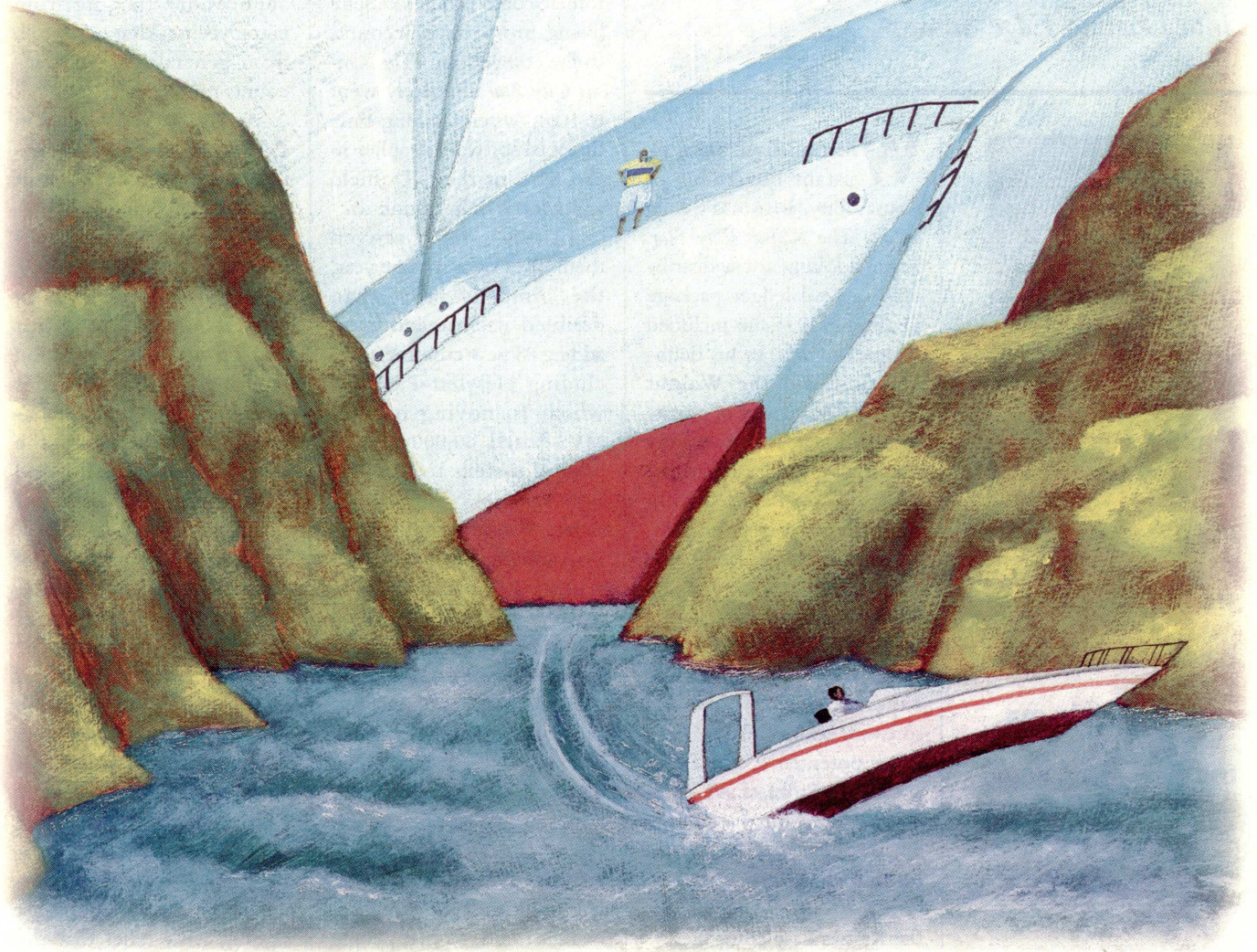
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## One Step Ahead

*PeopleSoft Turns "Bleeding-Edge"  
Financial/Client-Server Technology  
Into Leading-Edge Success*



**"We identify what we think is going to be a market trend, so that people can use [the technology] as early as possible."**

Rick Bergquist  
PeopleSoft

When Michael Finks, assistant controller of Kansas City, Missouri's daily paper, *The Kansas City Star*, began looking for a distributed general ledger package in August 1991, he included PeopleSoft Inc. in his deliberations. But the Walnut Creek, CA, vendor of client-server human resources software had just released its first financial packages during those dog days of summer.

Although PeopleSoft was already one of the more sophisticated client-server software suppliers around, the company didn't have enough experience with financial software to suit Finks. Like other potential customers at the time, Finks shied away from PeopleSoft. Its combination of financial and client-server technologies was just a little too "bleeding edge" for the Kansas City controller.

That was PeopleSoft's story from its inception in 1987 through 1991—four years of sheer determination to find customers brave enough to be the first to try client-server applications. But gradually founders Dave Duffield and Ken Morris convinced more than 50-customers to take the plunge.

Still, Duffield and Morris

were dogged by the question: Was PeopleSoft moving faster than its potential customers could handle? Despite losing prospective accounts to the competition (*The Kansas City Star* ultimately went to Ross Systems, a long-time financial software supplier in the DEC market), Duffield and Morris didn't think so.

In 1992, they proved themselves right. In one year, the company more than doubled its installed base, adding 88 new customers, including Hewlett-Packard, which is moving its IBM MVS-based 60,000-person payroll system to PeopleSoft's HRMS human resource management package. Five hundred people representing 140 companies attended PeopleSoft's third annual user group meeting in October 1992—double the number of attendees in 1991.

With a growing installed base as evidence, vice president of technology Rick Bergquist says PeopleSoft is moving at the pace customers want: "We identify what we think is going to be a market trend, so that people can use [the technology] as early as possible."

This market trend includes pairing just about any SQL-based back-end server—from a 486-based system to an HP 9000 running Oracle on top of HP-UX to an IBM 3090—with front-end PCs running Microsoft Windows "across just about any network," says Morris. (The majority of PeopleSoft's customers run Novell Net-

ware.) But it also includes providing flexible client-server models for back-office applications ranging from employee tracking to payroll, from general ledger to accounts receivable.

A 4GL toolset written in C, PeopleTools, makes on-line customization of most applications (not payroll—still a batch-processed application) easier. Says Morris: "The toolset implements an application model, so if what you do fits that application model, all you have to do is define the data you're tracking and present it to the user." Implementation and maintenance times are cut significantly.

Thanks to the advent of downsizing and re-engineering, PeopleSoft no longer struggles to indoctrinate the unconverted in the ways of client-server architecture. But that's a mixed blessing. The rest of the industry is catching up and more competition is fighting over an increasingly sophisticated installed base. Still, you can almost hear Rick Bergquist sighing with relief that the company's missionary days are over: "We've been on the leading edge so long, we've overcome those [educational] hurdles." — Elaine Appleton, Contributor

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# The Optical- Enabled Office

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BY RON LEVINE

**O***ptical storage is emerging as today's premier enabling technology* for new applications. Its ability to store immense capacities on a standard-sized disk or tape; intermix voice, video, and data on a single storage media; and provide protected, on-line access to archived files is providing system designers and application developers the tools they need to break new ground in data processing. Commercial, medical, financial and governmental applications were previously shut out of the automation cycle either because of the lack of a tamper-proof audit trail, the vulnerability of magnetic media, or the computer's



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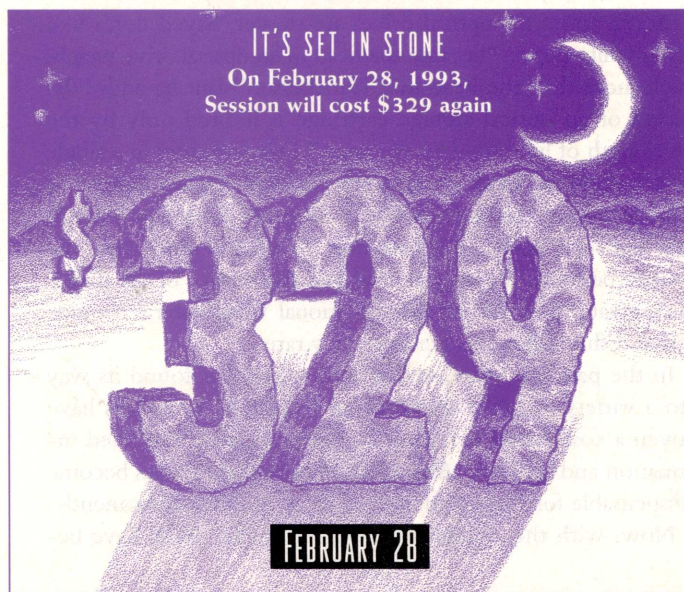
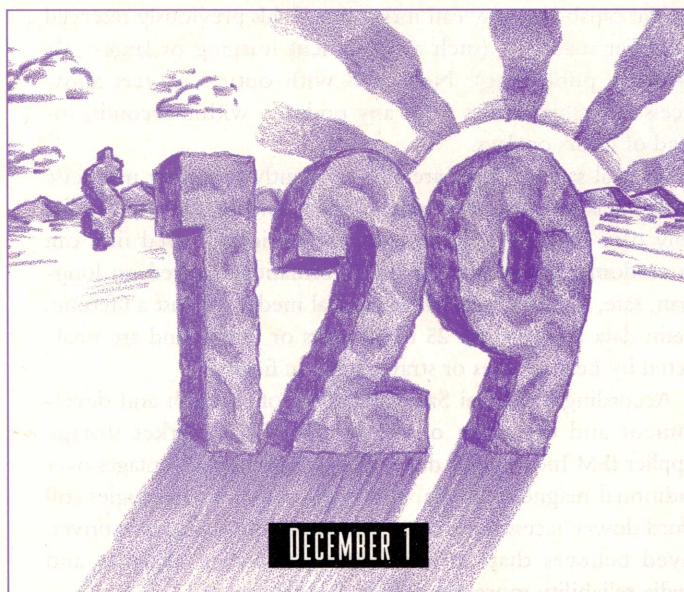
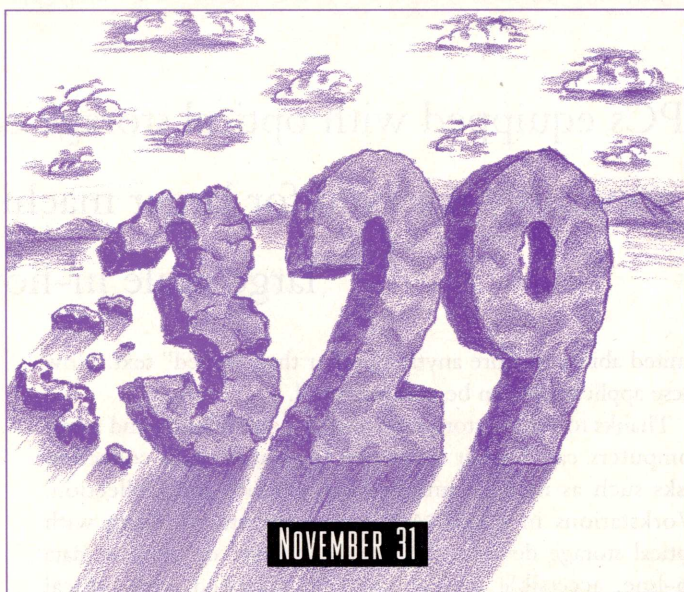
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## PCs equipped with optical storage capability now can move into fields previously reserved for larger machines, such as document imaging or large-scale in-house publishing.

limited ability to store anything other than "typed" text. Now these applications can be computerized.

Thanks to optical storage technology, mainframes and mini-computers can further automate large-scale data collection tasks such as medical imagery and satellite data collection. Workstations in CAD/CAM environments, working with optical storage devices, can keep a terabyte or more of data on-line, accessible in seconds. PCs equipped with optical storage capability now can move into fields previously reserved for larger machines (such as document imaging or large-scale in-house publishing). Networks with optical servers allow access to archived files from any node — within seconds, instead of hours or days.

Optical storage units are also efficiently replacing magnetic tapes on large-capacity systems and networks for unattended daily data backups. Unlike tape, the optically-stored files can be randomly accessed. And the information is saved on long-term, safe, secure media. Most optical media will last a lifetime, retain data integrity for 25 to 50 years or longer and are unaffected by head crashes or stray magnetic fields.

According to Husni Sayed, director of research and development and chairman of the board of HP market storage supplier IEM Inc., optical disks offer tremendous advantages over traditional magnetic media. Although optical technologies still afford slower access times than Winchester-type magnetic drives, Sayed believes that optical's superior storage capacity and media reliability more than offset this deficiency.

Access times for optical drives are slower, Sayed notes in a recent white-paper, "because the head in an optical drive weighs much more than the head in a Winchester." But he adds "the density of an optical storage cartridge is limited only by the wavelength of light used by the laser." Data volumes in a single 5 1/4-inch optical disk cartridge can exceed 800 MB compared to 1.2 MB for a standard 5 1/4-inch magnetic floppy or 400 MB for a high-end Winchester hard disk. Sayed also notes that "the distance between the optical head and the surface of the disk is much greater than that used by traditional Winchester technologies, and this makes head crashes very rare."

In the past few years, optical technology has found its way into a variety of niche applications. CD-ROM cartridges have proven a cost-effective means for distribution of published information and software. And WORM optical media has become indispensable for those with a need to record data permanently.

Now, with the advent of rewritable media, users have be-

gun to recognize optical's potential to replace magnetic media for routine large-capacity storage applications. Network backup, data archiving and document imaging are just a few examples. Also, newer multifunction optical drives now allow either rewritable cartridges or WORM media for archiving purposes to be used in the same unit (the 3 1/2-inch LD-320, from Laser Magnetic Storage Int'l. accepts both rewritable and CD-ROM media), providing users with flexibility not available from traditional magnetic storage.

Optical tape units are also replacing magnetic tape drives for mass storage requirements such as network archiving and remote imaging applications. The write-once (WORM) optical tape drive from Creo Products Inc. uses ICI Imagedata's digital paper media in 12-inch reels to store the equivalent of more than 1/2 billion sheets of standard-size paper. Average access time to its 1 terabyte (1,000 GB) of data is 37 seconds. Media cost of 1 cent per megabyte and direct-to-any-record addressing makes optical tape a viable replacement for magnetic media in large storage applications.

### HP's Optical Options

**H**EWLETT-PACKARD HAS BEEN A leader in the optical and multimedia fields since these technologies were first introduced. By using CD-ROM, WORM and rewritable optical systems, HP has addressed image management, network data management, and archive and backup applications for several of its customers, providing them with practical business solutions to their real-world problems.

For example, HP's implementation of hierarchical storage is a cost-effective file migration methodology that expands the fixed capacity of a hard disk by using the almost unlimited capacity of an optical jukebox. All of the user's data files are divided into a logical hierarchy; primary files (i.e., those accessed frequently) are kept on hard disk where they are instantly available when needed; secondary files (those accessed less frequently) are migrated to an optical library, thus freeing hard disk space. Because the secondary files are kept on-line on optical media, they're still only seconds away when needed.

HP also has been working with many partners to provide its customers with optical storage solutions. For example, the combination of HP's series 6300 libraries (which provide 20 to 90 GB of on-line storage) and Epoch's custom fileserver



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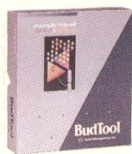
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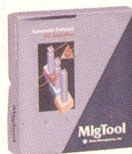
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controller gives users transparent access to all files, automated backup, and offline volume management on UNIX workstation networks.

### The Next "Phase" Of Development

**T**HIS PAST YEAR THERE has been an increase in the performance of optical drives, making them more competitive with standard magnetic storage devices. The use of phase-change recording (as opposed to magneto-optic recording), split-head optical design, digital servos, and read/write caching have speeded up data accessing. Optical drives, which had access times as long as 90 milliseconds now are down to the 35 to 45 ms range, some faster. Alphatronix new Inspire II series of erasable optical drives claim an industry leading 14 ms effective access time (23 ms average access time).

The delivery of multifunction drives able to interchange WORM and rewritable media permits sites to inaugurate optical storage solutions for one application (like network backup) and later expand to another (like financial audit trails) without additional investment in equipment.

Other optical technology developments underway include the current testing of new optical media from Dow Chemicals and Kodak. 3M is developing a so-called "floptical" disk, while others have an optical version of a 3480 standard tape cartridge in R&D. And of course, performance (i.e., access and transfer times) is always being improved.

The 3M floptical technology permits development of high-capacity removable optical media. Capable of storing as much as 14 times more data than conventional 1.44-MB floppy disks, floptical combines the storage volumes required for sophisticated workstation applications and data with the portability and flexibility of diskettes.

To better market the new technology, 3M and several other storage technology developers, including Insite Peripherals, Maynard Electronics and Maxell Corp., recently formed the Floptical Technology Association (FTA). Last November, the FTA announced that it would coordinate a three-way agreement among HP, 3M and Maynard to manufacture floptical drives for HP 9000 700 series workstations. Maynard, a division of tape drive manufacturer Archive Corp. will produce the Archive SF21e 21 MB external subsystem for 3M, which will then join with HP to market the drive to Series 700 users. HP

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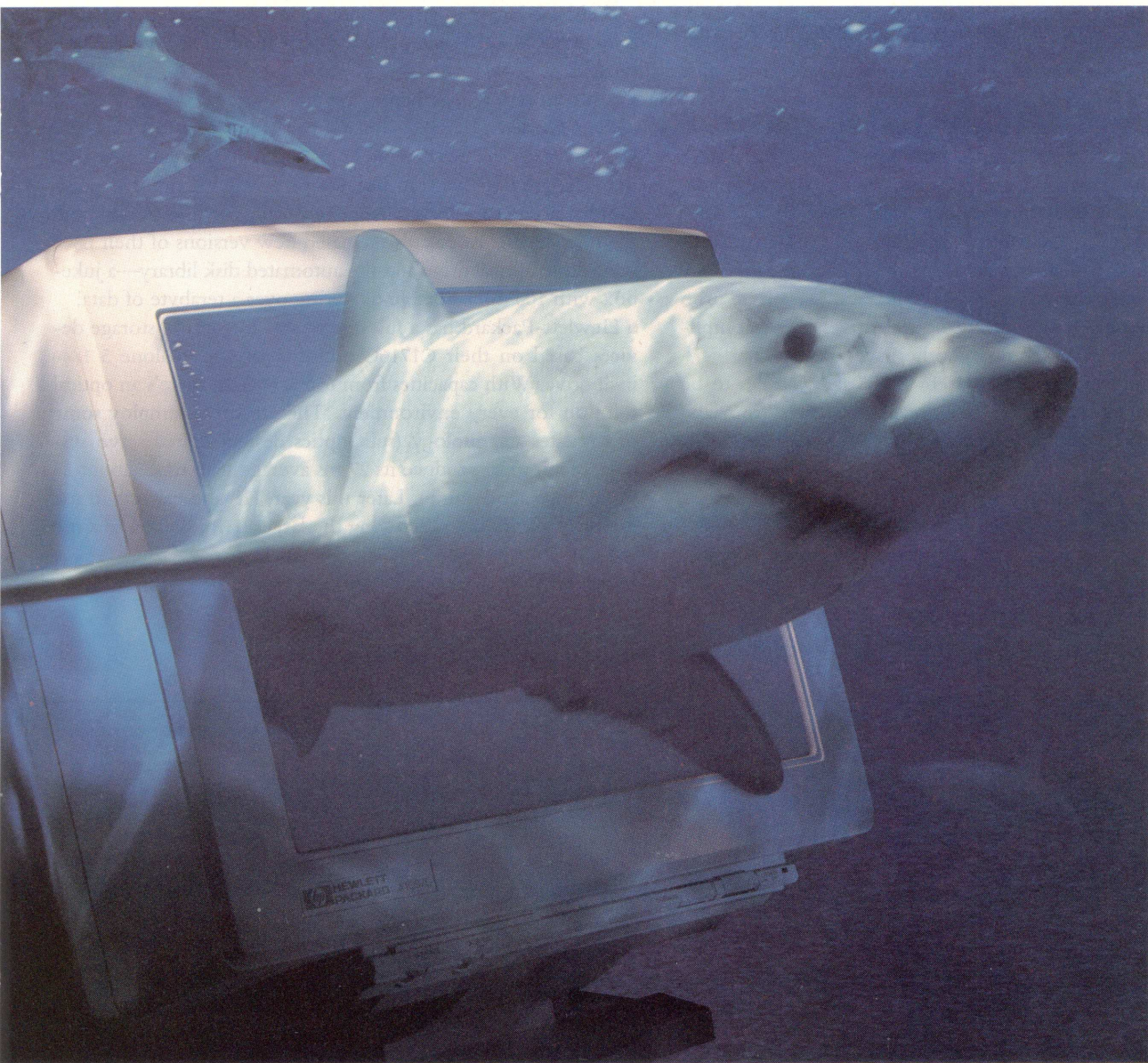
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will produce the software drivers necessary to integrate the external drive with the HP 9000 700 series. According to the FTA, the external floptical device should become available in the first quarter of 1993.

Other optical products recently introduced include:

- U.S. Design Corporation's Turbo Mass, a hardware "blackbox" that can boost optical drive performance from 200 to 500 percent. It does this by increasing either data transfer rates, individual command response times, or net I/O transaction rates. This is a SCSI-bus device with a caching technology that operates transparently to the host operating system. Turbo Mass is compatible with existing optical drives, SCSI-compliant drivers, and UNIX-based (and other) systems.
- AT&T's Data Management System (DMS) allows files to be archived to an optical server and remain accessible from any client on the network. Users retrieve archived files as "read-only" via standard UNIX system commands. Any node on the LAN can view and compare multiple versions of a file, as they existed at any point in time. DMS is an enhancement to AT&T's ABARS (Automatic Backup And Recovery System) product. It is compatible with a UNIX host.
- Contemporary Cybernetics Group's CY-2000-S rewritable drive contains a data encryption feature to limit access to sensitive files. You can still use standard 650 MB or 1 GB media,

and choose between encryption or non-encrypted mode. The units are SCSI-based and plug-and-play compatible with HP host systems.

- Last summer, Kodak began shipping its new 14-inch WORM platter (Optical Disk 6800-10.2 GB) that stores up to 10.2 GB of information. The new media holds about 50 percent more data than the previous version because of a switch from dye-polymer recording to a phase-change recording method. Along with the new media, Kodak also released new versions of their 6800 standalone optical drive and the automated disk library—a jukebox with 100 disks capable of storing over a terabyte of data.
- Hewlett-Packard has a full line of scalable optical storage devices based on their C1716C multifunction standalone 5 1/4-inch drive. With capacities from 650 to 94 GB, there's an optical solution for every environment. The HP drives employ some of the latest technology (split optics design, digital servo system, caching) to produce its 27 ms average seek time (about 35 ms average access time). Later this year, HP also expects to use double capacity disks, allowing the largest HP jukebox to store 184 GB.

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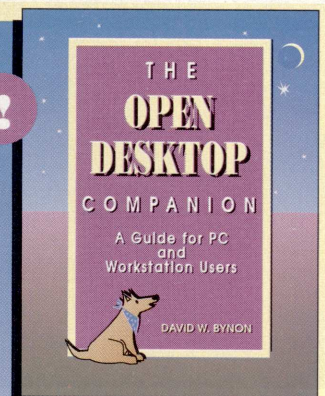
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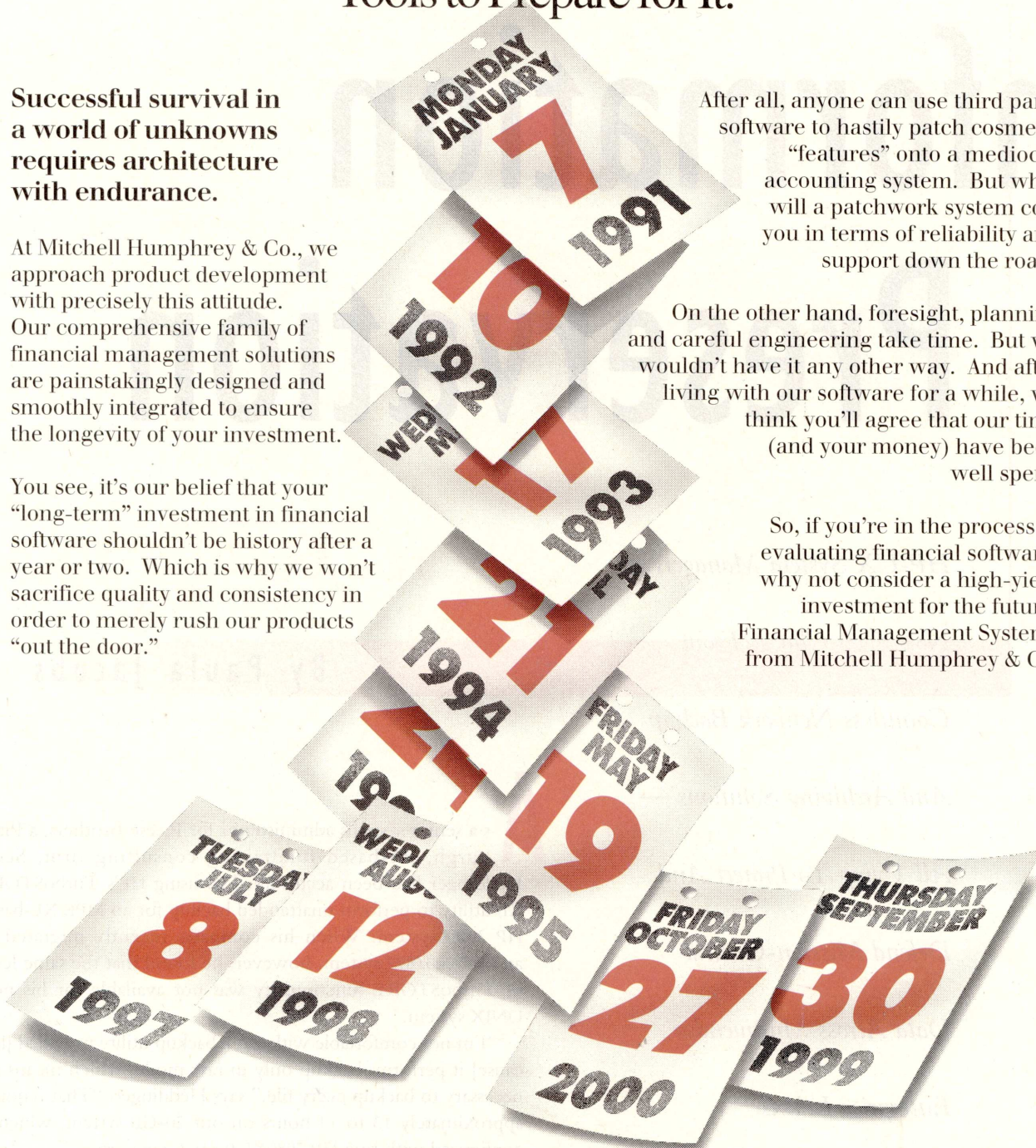
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**By Paula Jacobs**

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**A**s a senior systems administrator for Reese Brothers, a Pittsburgh, PA-based fundraising consulting firm, Scott Hedding had been accustomed to using HP's TurboSTORE XL utility to perform unattended backup for an MPE XL-based HP 3000 system. When his company recently migrated to an HP 9000/877 system, however, he found that the same level of TurboSTORE functionality was not available for his new UNIX system.

"I'm not comfortable with the F backup utility provided [because] it performs backup only in raw mode, which means it's necessary to backup every file," says Hedding. "That requires approximately 13 to 14 hours on our 20-GB system, which is configured with two HP 7980XE 9-track tape drives."

While he acknowledges that Hewlett-Packard is working to resolve this issue and is continuing to improve the UNIX version of TurboSTORE, Hedding required an immediate solution. "I cannot afford to stay up all night backing up the



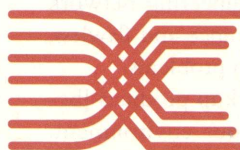
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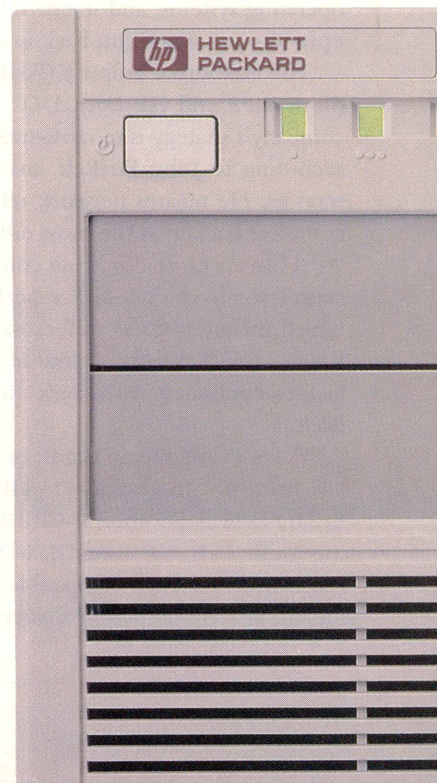
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system," he explains. And, for now, he's simply too busy to test commercially available UNIX backup solutions.

Fortunately for Hedding, a little ingenuity has paid off, resulting in a happy ending. By tweaking the HP-UX backup utility and installing patches from HP's Response Center, his UNIX backups now take approximately five hours. All the computer operator needs to do is mount the tapes.

Meanwhile, Hedding is making every effort to take further advantage of the faster HP 9000 CPU performance. "My bottleneck is that the data can only be put on the tape at a certain rate," he explains. Therefore, he's now working to split the backup into two separate processes in order to get both processes to write simultaneously.

## The UNIX Backup Challenge

"THE CHALLENGE IN COMMERCIAL environments is to backup quickly without taking the system offline," says Craig Ledo, product manager, systems management and high availability products at HP's General Systems Division. "Performance is important, particularly on systems with large databases."

In any system environment, high-capacity, fast performance and ease of use are fundamental considerations. Users also want the flexibility to support a variety of storage devices, including traditional tape devices, and the newer technologies of digital audio tape (DAT) and optical jukeboxes.

A typical UNIX environment consists of multiple workstations and servers containing a tremendous amount of data for mission-critical applications. And because UNIX users have bought into the concept of open systems solutions, industry-standard backup solutions; support for heterogeneous UNIX operating systems; and standard UNIX utilities, such as **tar** and **cpio** also are significant backup considerations.

The Foxboro Company (Foxboro, MA) has a mixture of HP (both MPE and HP-UX), DEC and Sun UNIX systems. The company's strategy is to cross-train staff on all of these platforms, according to John Puckett, manager of engineering network services. He regards network reliability assurance and flawless, complete backup as the most difficult backup problems.

"However, we don't use commercial backup products [because] we haven't found a perfect fit for our environment, which includes PCs as well as workstations," explains Principal Engineer Al Sonnenberg. Instead, Foxboro uses the UNIX dump facility combined with some simple scripts to automate tape backup.

There's certainly no dearth of hardware products for the HP-UX platform. In addition to HP's JetStore products, Bering's ECHO DAT/DDS 4mm 2-GB DDS tape backup subsystem and the ArchiveST 2000 4mm DDS-DAT tape system from Maynard Electronics are both compatible with HP-UX. Other vendors, including Contemporary Cybernetics Group, IEM and Mesa

Technology, also offer a host of high-performance solutions, including tape backup, for HP-UX platforms.

HP-UX users don't have to rely solely on homegrown software backup solutions either. An increasing number of software backup applications now support HP-UX, multiplatform UNIX installations and distributed computing environments.

Delta Microsystems' BudTool is a software application program for automatic backup and retrievals. BudTool works with standard UNIX utilities to backup either a single system or a heterogeneous network. Also available is FreezeFrame for "live" backups of file systems and databases, and it can be used in conjunction with BudTool or with standard UNIX utilities, such as **tar**, **dump**, **cpio** and **dd**. These products are supported on HP 9000 300/700 systems.

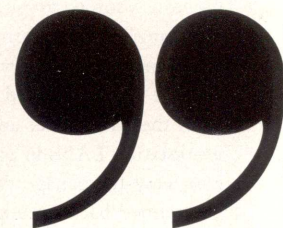
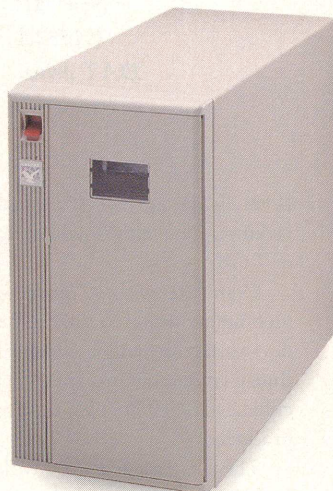
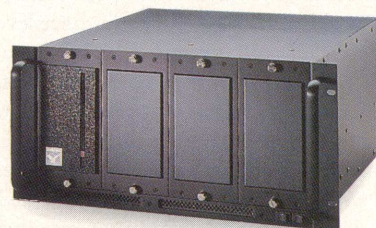
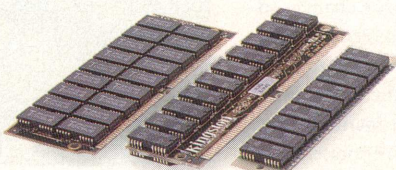
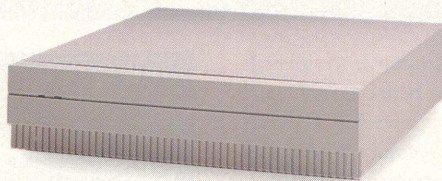
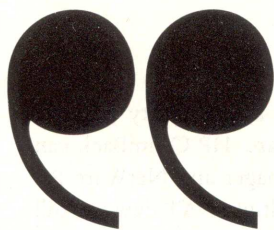
The UniTree hierarchical file and storage management system, licensed by General Atomics' Discos Division, is a tool for managing the growing volume of data in high performance computing environments. A unique feature of UniTree is its automated backup and restore function. UniTree provides continuous, non-intrusive, incremental, multilevel file backup and restoration. Files are copied onto backup media within a site-specified time window after they have been created or modified. The system administrator determines the number of duplicate copies (up to 16). UniTree restores a file from backup automatically when the file is referenced and the on-line version is not available. UniTree supports TCP/IP networks of UNIX clients running either NFS or FTP, and also supports Ethernet, FDDI, HYPERchannel, UltraNet and HPPI networks.

## Network Backup The HP Way

IN DISTRIBUTED COMPUTING environments, network-wide data integrity and reliability have become increasingly important. Networks are growing in size, capacity, and in the types of heterogeneous devices supported. Yet, network backup can be tedious because of the tracking, logging and recovery procedures required. There's also an additional need to access files from different systems across an enterprise-wide network. Performance is another critical factor, particularly with the immense quantity of data and databases found in the typical networking environment. And, finally, as networks grow in size and become more difficult to manage, many system managers are demanding backup products that can integrate with their network management tools for a single, enterprise-wide view. Several network-wide backup solutions — for both HP-UX client and server modes — now claim to address all of these concerns.

HP's OmniBack and OmniBack/Turbo products provide central file system backup and recovery for both standalone and networked distributed systems. HP OmniBack provides central control to back up an entire local area network of servers and workstations, including heterogeneous environments that in-





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clude HP-UX, HP Apollo Domain, and/or SunOS systems. For example, Sun SPARCstation users can backup their workstations over a network to an HP-UX or HP Apollo Domain workstation system.

Additionally, when integrated with a third-party package called Plan-B provided by Quest Software, HP OmniBack can provide central PC backup of LAN Manager and NetWare PC LANs. Because OmniBack supports multiple DAT devices, full

## NOW DAT'S FAST: HP'S LATEST HIGH-PERFORMANCE STORAGE OPTIONS

At last November's COMDEX Expo, HP's Computer Peripherals Bristol division announced what it claims is the fastest 4mm Digital Audio Tape (DAT) drive in the industry. The new HP C1532A DAT drive's data transfer rate is 510 KB per second without data compression and 2 MB with compression. According to John Boose, general manager of the Bristol division, these transfer rates are "at least 40 percent faster" than those of HP's nearest competitors.

To obtain the increased performance levels, HP made changes to its DAT drive controller, increased the tape speed and reengineered both the tape-path and head-to-tape interfaces. According to Stan Corker, a senior analyst at International Data Corp., the new drives, which will be sold through HP's original equipment manufacturer (OEM) and distributor sales channels before being incorporated into HP system and server product lines, should push 4mm technology into the realm of high-performance mass storage. "HP's introduction is a major step forward, moving 4mm DAT into markets that were previously forced to use alternative technologies," says Corker. Until now, most high-performance backup solutions have been dominated by 8mm tape and other storage media.

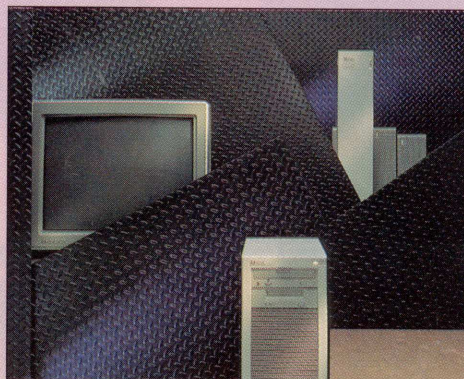
The C1532A could also move high-performance backup away from the data center and closer to the end-user. Users of PC and workstation LANs in particular, notes Boose, are looking for low-cost, easy-to-manage yet high-speed backup solutions. "Think of unattended backups taking place during lunch breaks, rather than overnight," says Boose. The redesigned drives also offer enhanced data reliability with a mean-time-between-failures rate of 200,000 hours, which makes them even easier to manage and maintain than previous DAT drives.

The C1532A can store up to 8 GB of data in 65 minutes on a 90 meter Digital Data Storage (DDS) cartridge. The drive complies with the industry-standard DDS data storage format, which HP has been promoting for the last few years. DDS is designed to ensure read and write interoperability across drives from different manufacturers. The C1532A drives use 60- and 90-meter DDS media recognition system cartridges.

### And New Disks To Boot

In a related announcement, HP also introduced a new family of high-performance small computer systems interface-2 (SCSI-2) mass storage systems. The new systems, which incorporate HP's new 1-GB (half-height, 3 1/2-inch) and 2-GB (full-height, 5 1/4-inch) hard drives, are supported on HP 9000 800 series servers and HP 3000 900 series business systems.

The SCSI-2 devices are available in two different configurations: a compact deskside "minitower" and a rackmountable unit designed for HP's 19-inch EIA cabinet. Both configurations are available with either a single 2-GB drive or two 2-GB drives for a total of 4 GB.



*HP's new SCSI-2 mass storage servers.*

*New HP C1532A DAT drive.*



Both 1-GB and 2-GB upgrade kits are also available, and both rackmount and minitower configurations can expanded to a maximum of 7 GB.

Complete with a "power-fail" reset feature, which prevents incomplete writes to disk in the event of power loss, the new SCSI devices also are designed to ensure data integrity. A projected mean-time-between-failure rate of more than 300,000 hours promises enhanced reliability over the previous generation of HP mass storage products.

The new disk drives, on which the mass storage systems are based, replace HP's previous generation of 422-MB, 677-MB and 1.3-GB high-performance drives. Less expensive than their predecessors, the new drives enable HP to offer more storage capacity for the same price. For instance, the 2-GB system is offered at the same price as HP's previous 1.3-GB unit, and the 1-GB expansion kit is priced 44 percent lower than its 670-MB precursor. The new drives also deliver enhanced access times — average seek time has been reduced from 13.5 milliseconds (ms) to 11.5 ms for the 2-GB drive and from 12.6 ms to 10.5 ms for the 1-GB units — as well as reduced average latency.

Pricing for the SCSI-2 units is as follows: \$7,100 for either the rackmount or minitower system containing one 2-GB hard disk, \$13,800 for either the rackmount or minitower system containing 2 2-GB hard disks, \$3,850 for a 1-GB expansion kit and \$6,900 for a 2-GB expansion kit.



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backups can be performed unattended. HP OmniBack/Turbo also supports backup of raw disk devices, as well as on-line backup of Oracle databases. Both HP OmniBack and HP OmniBack/Turbo also can be integrated with HP OpenView software to provide single-view management of system backup from an HP OpenView Network Node Manager workstation. These products support multiple DAT/DDS devices, as well as HP's Rewritable Optical Disk Library Systems.

### Third-Party Backup Bonanza

**H**IBACK/UNIX FROM HI-COMP America is another product for backup and retrieval of heterogeneous, networked UNIX systems, including HP-UX. It provides both local and remote backup over a network, supports data compression, device sharing, and high-speed access to remote devices on other nodes. In a networked environment, HIBACK must run on every node in the network. For larger networks, HIBACK can be used with the company's HIBARS backup management software to centrally control HIBACK nodes over a network for local scheduling, unattended backup, or remote data retrieval.

HIBACK also includes interactive and menu-driven interfaces, which can automatically create batch files for future unattended HIBACK operation. The product's HI/SPLIT feature allows up to four similar backup devices to be accessed in parallel, and can write to four DAT devices at maximum write speed. HIBACK supports all HP devices, including tape, DAT, cartridge and hard disk.

Software Moguls' SM-Arch, is a network backup and extraction software system that supports the HP 9000/700 series of HP-UX systems as both clients and servers. It provides automatic and unattended backup for each user on a system network. SM-Arch supports remote backup devices, with multiple simultaneous backups through single-point control. It also provides optical jukebox support and allows four drives to be connected to four different client systems while operating the jukebox from the backup server and maintaining a single, on-line catalog and media library.

Another multivendor backup solution is Systems Center's BACKUP.UNET. Available on a range of UNIX platforms, including HP-UX, Apollo Domain/OS, DEC Ultrix, IBM AIX and SunOS, BACKUP.UNET permits any workstation on a network to backup and restore data for any other workstation.

Backups and restores using BACKUP.UNET can be initiated locally from the individual user's workstation or scheduled and managed centrally by a system administrator. This flexibility enables users to share as much backup functionality and administrative service as they want without necessarily adhering to the same backup or restore schedule. Users can share tape drives, share tape media (including the same tape volume) or share a summary log of administrative tasks as they see fit. If a storage

**A**s downsizing companies begin to decentralize data center operations, vendors have developed functionality designed to manage backup of distributed systems onto a central mainframe.

device fails, users can switch to an alternate system's storage devices at will, so that there is no single point of failure for network backup.

For users in strictly HP-UX environments, storage vendor IEM Inc., recently announced plans to market Alexandria, an integrated network backup, archiving and library management solution from Spectra Logic. Alexandria supervises backup and archival storage, manages automated media changers and jukeboxes, schedules full or incremental backup and restore operations and even manages off-site libraries. Backup files can be included or excluded by pattern, user group or date; repeats can be scheduled by hour, day, date, day or week, month or year. Users can also specify duration of library storage; Alexandria automatically tracks media usage and requests replacement when the media's maximum shelf-life (as defined by the user) has been reached.

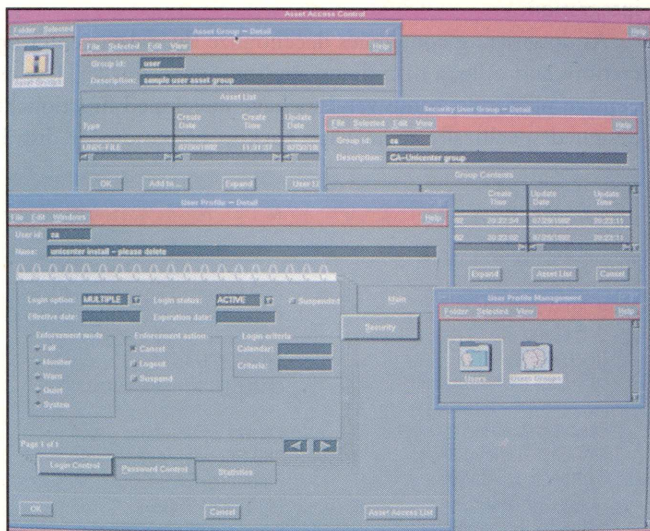
Alexandria, which Spectra Logic also markets for other UNIX platforms, currently runs on the HP 9000 300, 400, 700 and 800 series. Designed to be independent of storage medium and network transport, Alexandria manages both 4mm DAT and 8mm helical scan tape devices, as well as rewritable optical disk drives. The physical storage media and the library structure are transparent to end-users.

Workstation Solutions, a provider of system administration tools in the Apollo Domain/OS market, entered the general UNIX backup market earlier this year with the introduction of Quick Restore. A network backup application that runs on the HP 9000 Series 700, the RS/6000 and Sun SPARC platforms, Quick Restore implements a client-server model to access both local and remote file systems and tape drives from any point on a network.

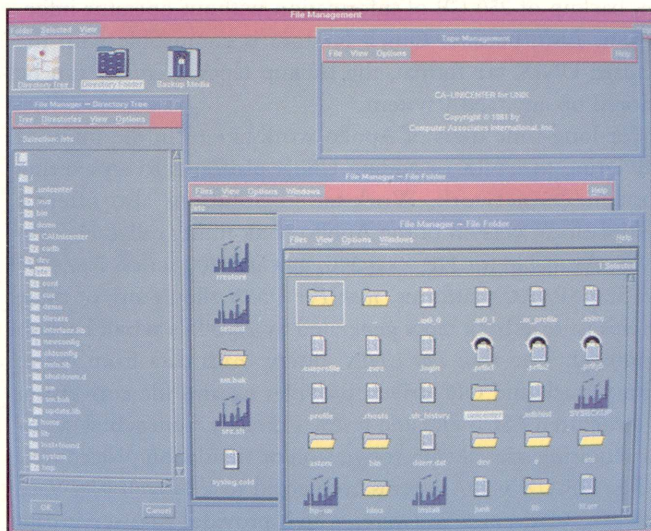
Quick Restore makes use of on-line catalogs to maintain backup histories, volume IDs and "direct-to-block positioning information." (Direct-to-block positioning, a feature of Exabyte



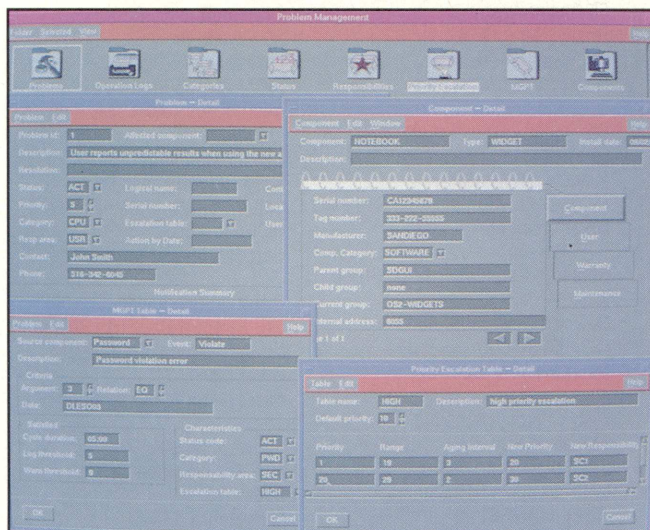
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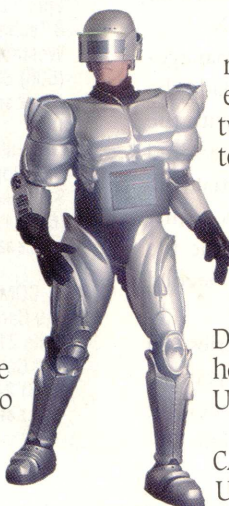


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8mm tape drives, speeds the location and restoration of data files.) Quick Restore also handles multiple backups and manages backup of 250 GB of information without operator information. Also, because Quick Restore is compatible with the standard UNIX **tar** format, the backup tapes it creates can be restored on any UNIX system.

For long-time users of Apollo workstations in the midst of converting to UNIX or adding UNIX platforms to an existing Domain/OS network, Workstation Solutions also offers a multiplatform version of the Apollo **rbak** utility called *rbak For UNIX*. Available for HP 9000 300, 400 and 700 series, RS/6000 and Sun SPARC platforms, *rbak For UNIX* allows any of these systems to read back tapes generated by Apollo's **wbak** backup command. The *rbak For UNIX* utility reads data from 4mm, 8mm 9-track and QIC drives, provides streams file conversion for structured ASCII files and restores directly from **wbak** without requiring special tape conversion or translation procedures.

For HP-UX v8.07 systems connected to a Novell NetWare network, Cheyenne Software, which provides ARCserve data management products for Novell networks, recently announced a module that provides backup for HP workstations. The ARCserve agent option for UNIX provides backup and restoration capabilities.

Two other network backup products, which support HP-UX in client mode only, are Legato's NetWorker ClientPak I and Epoch Systems' EpochBackup, both featuring automatic file recovery. ClientPak I works in conjunction with NetWorker server software (which must be purchased separately) running on a Sun SPARC system, IBM RS/6000, or a NetWare 3.11 LAN server. EpochBackup, which supports an HP-UX client, also requires additional hardware for server mode — either a Sun SPARCstation or an Epoch-2 Backup Server.

## Mainframe Backup Alternatives

**I**N ADDITION TO NUMEROUS backup and archiving applications native to the UNIX environment, in keeping with the industry's downsizing trend, several mainframe software vendors have recently moved their applications to UNIX.

For example, Computer Associates whose system management utilities were a staple of IBM mainframe shops, made the leap to HP-UX and other UNIX environments last fall with the introduction of CA-UNICENTER. In addition to standard backup functionality, such as capability to perform partial, full and incremental backup, CA-UNICENTER also offers mainframe-class features such as automatic archiving when the file system is full, automatic restore when archived files are needed and library management to avoid tape loss.

Available on HP 9000 Series 700 workstations and Series 800 servers, as well as UNIX systems from Sun, Sequent, Pyramid, CA-UNICENTER also supports PC-based network operating systems, including Novell Netware and IBM's OS/2. The ad-

dition of support for PC platforms makes this an attractive option for enterprise network managers struggling with PC/UNIX integration.

As downsizing companies decentralize their data center operations and offload mainframe applications to smaller, less-expensive platforms, some vendors have developed functionality designed specifically to manage backup of remote or distrib-

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uted systems onto a central mainframe. Network Systems has introduced Central Archiving, part of its integrated User-ACCESS product designed to manage archiving, backup and information retrieval from remote sites. Central Archiving typically runs on an IBM VM or MVS mainframe, but can also reside on an HP 9000 or VAX/VMS machine, and captures output from the standard backup utilities of a variety of proprietary and UNIX platforms.

User-ACCESS with Central Archiving can, for example, backup HP 3000 systems running MPE/iX via an interprocess communications port (IPC) and it supports standard MPE STORE and RESTORE commands as well as TurboSTORE/XL II. For Apollo Domain/OS users, Central Archiving can make use of standard piping facilities to capture information from the **wbak** utility and restore data via **rbak**. HP-UX and standard UNIX utilities, as well as many third-party backup formats, are also supported, as are backup utilities for Digital VAX/VMS, Stratus and Data General systems.

Unlike many segments of the computer industry, rapid growth still characterizes the UNIX backup software market, and it's expected to continue through the middle of the decade. Gartner Group, the Stamford CT market research firm, predicts a 97 percent compound annual growth rate for UNIX backup and storage server software shipments during 1993 alone. As a

consequence, users should expect to see even more and better network backup software options come to market. Distributed backup and archiving represent a large opportunity for software vendors, particularly those who specialize in system management and administration tools, and new functionality as well as higher levels of integration should result from increasing competition in this relatively high-margin market.

Maintaining data integrity remains a challenge for any system manager. But it can be especially daunting in UNIX environments, where there can be many self-sufficient workgroups, each with its own backup strategy and procedures. As corporations come to rely on distributed networks and re-engineering integrates information processing more tightly, core business activities, such as sophisticated backup and archiving applications, become increasingly critical. The wide availability of storage management solutions is good news for HP-UX system users. — *Paula Jacobs is a marketing consultant based in Framingham, MA. She can be reached at [pjacobs@world.std.com](mailto:pjacobs@world.std.com).*

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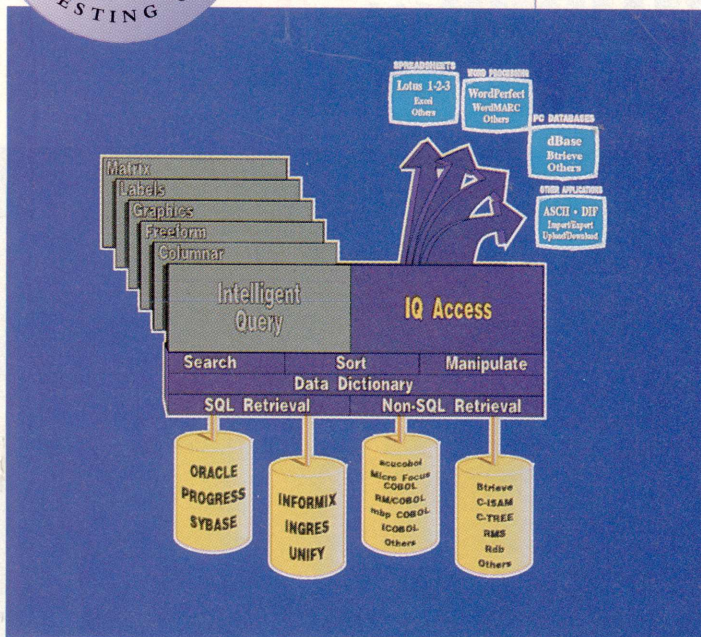
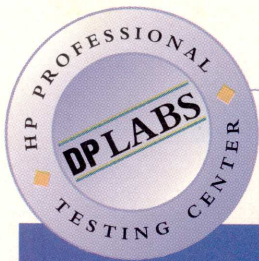
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To install IQ, your system should have the following: a 25 MB free disk, a tape or diskette drive, a character-based terminal, and a full-development version of a UNIX DBMS/SQL (for example, Informix, Oracle or Ingres). The load is a typical UNIX install that involves log-

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ging in as root, making a directory to hold the IQ files, **cd**ing to that directory and using the particular variant of **cpio** shown on the distribution medium's label to load IQ to your platform. In our case, to load it on our 9000/834, this latter command was:

```
tcio -i /dev/rct/c3d0s2 | cpio -1vcBdum
```

Upon completion of this piped directive, we only had to run a script called "iqinstal," which unpacks loaded files, carries out a checksum to ensure files weren't damaged during transfer, verifies file sizes, and removes files used only for installation. From start to finish, installation of IQ took approximately 15 minutes.

### The IQ Test

When we began our test, we ran into a few problems because we hadn't properly set three IQ/HP-UX environment variables: IQDD, the full path location of

the IQ data dictionary; IQCAP, the full path name of IQ's own analog to /etc/termcap; and IQPATH, the full path where IQ has been installed. Once these variables were defined, we were able to start IQ and begin work with the first of its tutorials.

Begin, is the key word here. We selected fields from a sample student database, and instructed IQ to create a columnar report on those fields, and then we hit a snag. We followed the tutorial's instructions to press the END key to execute the command we'd just built, and

## TABLE

03/31/92

PAGE 1

MAJOR	CLASS-CODE					AVERAGE
	01	02	03	04	05	
BIOLOGY	3.44	~	~	3.17	~	3.22
CHEMICAL ENGINEERING	3.89	3.10	3.43	3.39	3.38	3.38
CHEMISTRY	3.58	~	2.88	~	3.12	3.29
ECONOMICS	~	~	~	~	2.94	2.94
ELECTRICAL ENGINEERING	3.75	3.36	3.02	3.47	~	3.40
HISTORY	3.98	3.03	3.43	~	~	3.24
INFORMATION COMP SCIENCE	~	3.42	~	~	3.26	3.36
MANAGEMENT INFO SYSTEMS	3.21	3.20	3.35	~	~	3.29
MATHEMATICS	~	~	3.48	~	~	3.48
PHYSICS	~	3.38	3.33	~	~	3.35
AVERAGE	3.63	3.20	3.33	3.26	3.15	3.29

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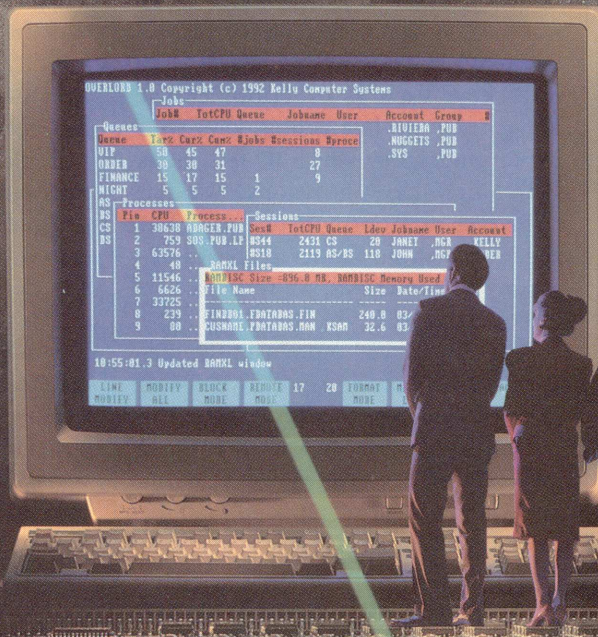
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we waited for our report to display. And waited and waited. Apparently, the END key hadn't been properly defined on any of the stations from which we accessed our 9000/834 IQ platform. IQ provides a simple solution to this problem in its maketerm utility. Maketerm lets you associate the keystrokes produced by "special" keys such as function, cursor movement, and line editing keys with the mnemonics by which IQ recognizes such single-key operations. We ran maketerm to properly define the END key, and with no further problems executing IQ commands, we went back to our tutorials.

The first tutorial introduces the creation of a columnar report, which requires several steps: select fields to be output, tell IQ that we wanted a "detail only" display (i.e., one with all field data but without totals of any kind), tap the END key to let IQ know we were finished creating our report request, type X (execute) from the then-redisplayed Main Menu, and select DISPLAY in response to IQ's query on whether we wanted our output to go to screen, printer or disk. After completing these steps, the columnar report we created appeared on the monitor.

## Intelligence Reports

This first session also led us through the sort and search functions on our columnar report. Using the User's Guide Instructions for reference, we performed ascending and descending sorts and searches on a combination of fields. We worked with several other sections of tutorials, concentrating on those lessons which we considered real-world business information needs.

For example, we created "computed fields," that is, an output item whose contents are based on some calculation involving other fields. We did this by selecting the Temporary Field Functions item from IQ's Main Menu, choosing the Arithmetic function, identifying to IQ whether the output item we wanted calculated would draw upon data fields or constants, designating the particular arithmetic operation we wanted to perform (Add, in our test); and finally enumerat-

ing the fields whose contents we wanted to find a sum, as well as naming the computed field into where the result of that calculation would go.

After we completed these components and keyed in ENTER, IQ brought us back to its Main Menu with the command "ADD HRS-EARNED PLUS HRS-XFR GIVING HRS-TOTAL" displayed, and with our created, computed field available for use in other ways, such as sorts and searches.

Another real-world rehearsal we tried was to create a matrix. To do this, we first cleared our current work from the screen with the Clear Procedure utility from IQ's Utilities submenu. Then, from the Main Menu we successively selected Output Types; Matrix (from the Output Types sub-menu); the fields from which we wanted to create the columns and rows of our table; the calculations we wanted to perform; the field on which we wanted to carry out those calculations (in our case, averaging the field Grade Point Average for all occurrences of our "row" field Class Code and our "column" field Major); and finally SPECIFYING no count of records in addition to the arithmetic we had just laid out. Having returned to the Main Menu; keyed IQ's everpresent X to carry out the procedure we'd just built; and selected Display to bring our procedure's output to our monitor, we saw a table similar to the one shown in *Table 1*.

The fact that IQ reports on several levels of sophistication and can be produced with permutations of the same set of simple techniques is a sign of how high IQ's report-production Intelligence Quotient is. The selection of data set to be operated on, of fields to be reported on, of annotating or calculating to be done to this raw data, of format and destination of reports produced, and more is all carried out by means of menus and the few keystrokes needed to navigate them. In effect, IQ gives you in visual orientation and operations what you used to need a 4GL programmer to produce. Or what might have required several such individuals — IQ can work with Informix, Oracle, Ingres, Sybase and Unify, among other DBMSs. ■



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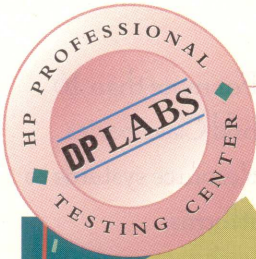
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# A Better Sort Of Sort

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## COSORT From Information Resources Replaces The UNIX Sort Command With A Performance-Enhancing Development Tool

One reason people use computers is to put things in order. Machines and applications spend a great deal of time sorting "stuff." Therefore, it follows that the overall performance of your system and the happiness of your users can be enhanced if the process of sorting can be sped up. Also, full-featured, flexible sorting utilities can provide your programmers with the tools necessary to develop better performing, more efficient applications.

Enter Information Resources Inc. (IRI). IRI's COSORT utility provides general purpose high-performance sort and merge capabilities. It can be used as a direct replacement for the UNIX sort command. COSORT routines can be coded into applications. Several options for both interactive and batch operations are provided.

### The Three (Inter)Faces Of COSORT

IRI provides three interfaces to COSORT. The first, already mentioned, is to replace your sort command with COSORT's sort command. The syntax is the same for COSORT as it is for the standard UNIX sort command, making it easy to use for experienced UNIX users.

The second interface is menu-driven. A series of prompts allows you to specify sorting criteria, which can be saved in a text configuration

David B. Miller



file for later use. Information you supply to COSORT includes:

**Record length.** COSORT handles fixed and variable length records from 1 byte to 32,767 bytes.

**Number of input files.** COSORT handles any number of input files.

**Keys** (ascending or descending). Keys begin anywhere in the record. Blank and character delimited fields can be used. Keys can be Numeric or Alphabetic. Alphabetic keys can be aligned left or right, trimming white space at either end. Key field characters can be converted to upper case before comparison. Numeric key fields can be interpreted in External format (any combination of human readable, signed or unsigned values) or in Internal format (binary representation).

**Output.** Output can be directed to a terminal or to a file. You can write your own output handler routine and have COSORT direct output records to it.

The third face of COSORT is the **sortcl** utility. Sortcl is a command language in its own right. Sortcl can be run from the command line or it can be placed in procedures. For example the sortcl command:

```
sortcl/REPORT/INFILE=file1/
FIELD=(NAME=COLOR,POS=8,SIZE=10)/
CONDITION=(NAME=COLOR,TEST=(COLOR EQ
"RED" OR COLOR="BLUE"))/INCLUDE=
(CONDITION=COLOR)/OUTFILE=color.out/
OUTPROCEDURE/NO DUPLICATES
```

reads the file file1, selecting only those records that contain the values BLUE or RED in the COLOR field, as determined by the /FIELD, /CONDITION and /INCLUDE qualifiers. The /REPORT qualifier causes unsorted output to be generated. The command creates the output file color.out, but the

/OUTPROCEDURE qualifier causes all selected records to be passed to the user written procedure cs\_output() before the output file is written. The contents of cs\_output() are determined by the programmer.

Many other options are available to customize the sorting, merging or reporting of records. For example, you can set up quite complicated data selection criteria based on multiple conditional expressions. Like the /OUTPROCEDURE qualifier, data can come from the user-written input procedure, cs\_input() as specified by the /INPROCEDURE qualifier or input data can come from a file. Key-field criteria can be specified on the sortcl command line or from the user-written procedure cs\_compare() as specified by the qualifier /KEYPROCEDURE. Selected fields can be chosen for display rather than the entire record. Processing statistics can be generated with the /STATISTICS qualifier.

### (Co)routine Investigations

Sorting and merging can be done through the mechanisms of the coroutine. Unlike in-line code or sub-routines, coroutines interact with the calling program at various points during the execution phase. Figure 1 shows how coroutines interact with a main program.

In practice, the coroutine is called at least five times. The first four calls define parameters such as whether a sort or a merge is to be performed, what input will be encountered, how comparisons will be handled and what form the output will take. The fifth call is the actual execution of the sort or merge.

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## T A B L E

Sort Options	Times					
	HP Sort			COSORT sort		
	Real	User	System	Real	User	System
-o <outfile>	3.5	2.8	.4	2.0	1.5	.3
-r -o <outfile>	3.5	2.8	.4	2.4	1.7	.3
-f -o <outfile>	3.4	2.8	.4	5.1	4.5	.3
-u -o <outfile>	2.0	1.7	.2	2.0	1.6	.2*

Comparison of HP-UX sort command and COSORT's sort utility.

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## FIGURE 1

## MAIN PROGRAM

```
call SORT
Send_Record_Routine
(materialize and select)
Compare_Routine
(precedence evaluate)
Receive_Record_Routine
(Process Next Record)
End
```

## SORTING COROUTINE

```
call for input record
- repeat until end -
call for comparison
- repeat until winner -
call with output record
- repeat above -
```

*The logical interaction between a main program and a coroutine. (As opposed to a subroutine, which returns to the main program only when it's completed, a coroutine interacts with mainline code several times during its execution.)*

ing coroutine methodology rather than in-line code or subroutines. First, intermediate files don't need to be produced. In a traditional sort/merge, you might write a routine that first extracts needed records or fields from one or more files and builds a separate file of physical records that are then handled by the sort/merge routine. The coroutine technique allows for the construction of logical records in memory, thus eliminating a large number of disk I/Os and temporary files.

Sorted records are returned by the coroutine to the calling program as they are known. Thus, display of output begins much sooner than when using traditional in-line code or subroutines.

The COSORT distribution contains many samples of programs using the coroutine methodology and the documentation aptly describes the process.

### Sort Out Problems

We ran COSORT several times, comparing it on a one-for-one basis with the standard sort command shipped with HP-UX. We ran the tests on an HP 9000 Model 710 running HP-UX version 8.07. The file we used consisted of 47-byte records and totaled three-quarters of a megabyte of data. We took IRI's word for it and ran both the COSORT sort and the HP-UX sort using the standard UNIX sort command switches. We ran five trials of each test and computed the average time (see Table 1).

Interestingly, a couple of things that we weren't expecting showed up. First,

notice the increased time required for the COSORT sort when we folded the letters to uppercase before sorting the records. Second, the -u switch worked as advertised for the HP sort, but the COSORT sort did not produce a file of unique records for output. Rather, it behaved as if the -u switch was not even specified.

These two questions gave me the opportunity to call IRI's technical support, who were both friendly and courteous. First, they found the problem with the -u switch and fixed it. Second, regarding the speed discrepancies on the test using the -f switch, they helped me appreciate that COSORT is really an industrial strength sorting product that doesn't kick in until you start sorting several megabytes of data. Therefore, it's a good idea to get a trial copy of COSORT for yourself and run it on some of your large datasets before making a judgement call.

Our tests focused on COSORT's drop-in sort procedure. There are certainly more compelling reasons to investigate COSORT's other capabilities, such as its library of I/O routines, its customization features and its coroutine architecture. Programmers and developers will find these features to be particularly useful when developing flexible applications.

As with any other tests, your results will depend on your data and on your environment. Certainly, COSORT is easy enough to test at your site. IRI is very willing to provide trial copies for your evaluation. ■

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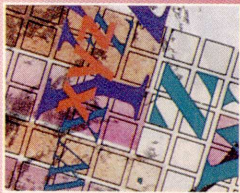
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## UNIX SYS\_ADMIN

Fred Mallett

You Don't Have To Be A UNIX Wizard To Master Shell Scripting — But It Helps

# Master Mind

*Editor's Note:*

After two years of focusing exclusively on the

use and management of HP Apollo systems running Domain/OS, Fred Mallett now turns his attention to more generalized UNIX system administration issues. We hope this new focus will meet the needs of both Domain and HP-UX users, as well as those in mixed environments. — Don Marks, Editor-In-Chief

I have a different kind of work ethic than most people: When the wind speed exceedeth 30 mph, thou shall not work, thou shall instead windsurf. On one such day while surfing, I was thinking about the shell scripting class I would soon be teaching to system administrators. In my experience, system administrators are the toughest group to teach — they always want to do things I know nothing about.

I must have been mumbling aloud about it, because as I sat resting on the beach a surfing wizard (he was easy to spot thanks to the stars, meteors and half-moons swirling above his sail) approached and asked me if it was in fact computer talk he had heard out on the water. After I explained my dilemma, he encouraged me to ask him a few questions, and maybe he could help. I laughed. After all, what could a windsurfer know about shell scripting.

### Ask, And Ye Shall Receive

**Fred:** How can you send output of a command to a loop structure without first putting it in a file?

**Surf-Wzd:** It's quite simple, though, it differs in **for** and **while** loops. In a **while** loop, the pipe can be used to send the output to the flow structure, but the

**while** command does not accept input. Therefore, the structure must use a **read** command to accept the input from the pipe. The **read** command has a zero status as long as input was read; status 1 is returned if end of file is read. The pipe should be located before the loop, or the loop won't terminate properly:

```
#!/bin/sh
output_command | while read data
do
    command that uses $data
done
```

The same could be true with a **for** loop, but the **for** loop won't take pipes, so you could use the open quote method of command substitution.

```
#!/bin/sh
for data in `output_command`
do
done
```

In the example above, you should notice that the variable **data** will contain the output of **output\_command** a word at a time, not a line at a time. To change how **for** (as well as the **read** and **select** commands) breaks input into words, use the **IFS** variable. In this ex-

ample, you set it to a new line to get one line at a time of the output of **output\_command**:

```
#!/bin/sh
IFS="
"
for filename in `output_command`
do
    command that uses $data
done
```

**Fred:** How do you read and write to different files in a script?

**Surf-Wzd:** Simply open different streams to each of the files and read or write to them using the korn shell **read** and **print** commands.

**Fred:** Huh?

**Surf-Wzd:** OK, let's create a scenario, then build a script to do it. I'll keep it simple. Suppose there are two files from which you want to look at data — files "a" and "b." To make it easy, let's assume that there are the same number of lines in each file. Let's create a file "c"





that contains the second field of each line of each file. You will use **exec** to open numbered streams to each file, (line 2) "a" and "b" for reading, "c" for write.

Next you will use a while loop to read from each file using the **-u** option of the korn shell **read** command to tell it which stream to read from (line 3). Notice that the last semicolon on the line is important for syntax. The **read** commands are reading the lines into three variables, as we wanted the second word. These will be the variables **a2** and **b2**. The third variable will catch the rest of the line. Finally (line 4) you print on stream 5 the contents of the two selected variables.

```
1 #!/bin/ksh
2 exec 3 c
3 while { read -u3 a1 a2 a3; read -u4
b1 b2 b3; }
4 do print -u5 $a2 $b2
5 done
```

## Two-Way Communication

**Fred:** One more question, what is this "two-way" pipe I keep hearing about? Hey, stop laughing.

**Surf-Wzd:** Sorry. It's a way of setting up two-way communication between processes in a korn shell. You can write to a child process spawned as a co-process (you create a two-way pipe to a co-process), then read output back. For example, if you wanted to clean up the format of the first example we did with the while loop, you could rewrite it to look like this:

```
#!/bin/ksh
ls |& #this created the co-process
while read -p data #This reads from the
pipe
do
command that uses $data
done
```

A better example of a co-process is one that uses the co-process interactively. In this example you will add the second field (a number) of each line in the file "summary."

```
1 #!/bin/ksh
2 bc |&
3 while read word1 number
rest_of_line
4 do
5 print -np "$number +"
6 done 7 print -p "0"; read -p sum;
print -p quit
8 echo "the sum is $sum"
```

Line 2 creates the pipeline to the arbitrary math process "bc." Line 3 and 6 set up the **while** loop to read input from the file "summary." Each line in "summary" will be broken into three variables, with "number" containing the second field. Line 5 sets up the equation being sent to "bc". Each number will be sent into the pipe because of the **-p** option, and **-n** means no newline, thus the equation being sent will be "number" + "number" + "number" + ". That's why line 7, after the loop is complete, sends a "0" to end the equation without changing it, and sends a newline. Now the co-process has output ready so you read it with **read -p** into **sum**. The last print on line 7 is to quit the "bc" program. Then we **echo** the result.

By now the wind had dropped to 28 mph, which was a drag because it meant I had to go back to work. As I was leaving the beach, The windsurfing wizard pulled out in front of me in his red VW pop-top camper van. I couldn't help but notice his license plate: UNX-WZD.

Would you like to continue to see articles on this topic?  
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## || exec [ arg ... ]

If **arg** is given, the command specified by the arguments is executed in place of this shell without creating a new process. Input/output arguments may appear and affect the current process. If no arguments are given the effect of this command is to modify file descriptors as prescribed by the input/output redirection list. In this case, any file descriptor numbers greater than two that are opened with this mechanism are closed when invoking another program.

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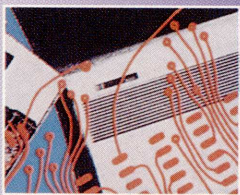
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## PC TIPS

Miles B. Kehoe

## Expanded Memory Improves Performance And Opens Windows For PC Users

# RAM Chargers

Using expanded memory under DOS can be useful for

RAM disks, spreadsheet programs, or even print spoolers. However, when using Windows you'll find that it's generally best to let Windows itself emulate expanded memory from its extended memory pool. RAM disks and disk caching are also useful for increasing your system's performance. Use the following tips and see if your system works better.

You'll be making changes to your configuration files, so I suggest you create backup copies of CONFIG.SYS and AUTOEXEC.BAT. The bare-bones files you can start with are listed below.

### CONFIG.SYS

```
DEVICE=C:\WIN31\HIMEM.SYS
DOS=HIGH,UMB
DEVICE=C:\DOS\EMM386.EXE NOEMS
FILES=10
```

The NOEMS option in EMM386.EXE specifies that extended memory (XMS) should not be used to emulate expanded memory (EMS). When you specify this option, the only function that EMM386 serves is to create upper memory blocks (UMBs) that DOS and device drivers can use.

## Expansion Through Extension

If you use Windows, it's best to specify NOEMS in EMM386.EXE and let Windows emulate EMS for you. If you don't use Windows, you can create EMS from the extended memory in your system using the EMM386.EXE device driver.

The first step to set up this EMS simulation is to specify UMBs in the DOS statement in CONFIG.SYS as shown above. The second step is to tell EMM386.EXE to allocate EMS using your XMS.

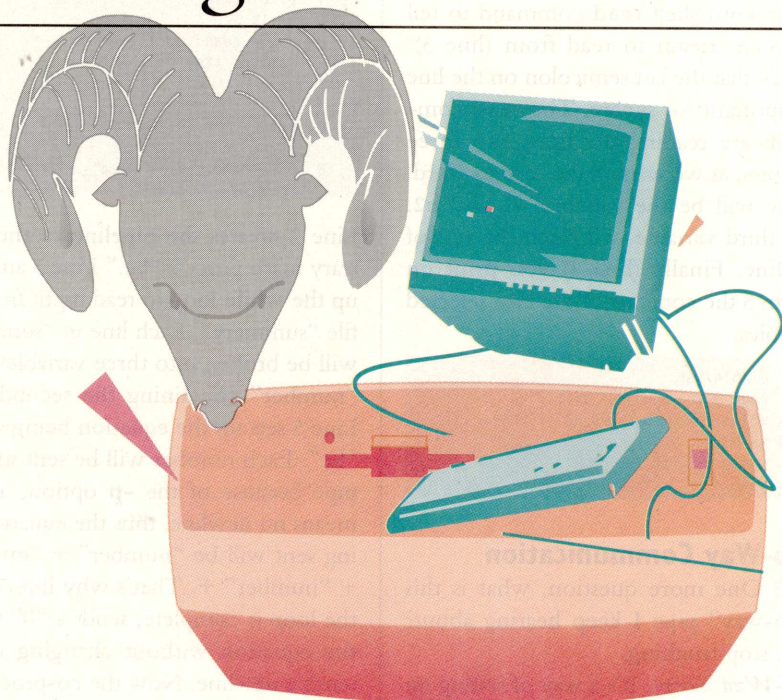
This is executed by means of command line parameters in the DEVICE line. The general format is:

```
DEVICE=C:\DOS\EMM386.EXE [[memory [ram]]] |
noems
```

Although there are several other options, we will only consider these. (Refer to your DOS 5 manual for other options.) The memory parameter represents a numeric value that specifies the amount of extended memory that should be used to simulate EMS. You can specify any decimal value from 16 (for 16 KB EMS) to 32767 for 32 MB EMS). Of course, there is no point in specifying more than existing XMS of your system.

The RAM option creates UMBs in addition to simulating EMS. If you don't specify any value for memory, the default is 256 KB.

You will notice that the NOEMS memory and RAM parameters are mutually exclusive: specifying NOEMS overrides the other parameters.



A typical entry might read:

```
DEVICE=C:\DOS\EMM386.EXE 512 ram
```

This creates 512 KB expanded memory area; of course, the amount of available extended memory will decrease by this amount. The statement also creates UMBs that you can use to load device drivers or the system into upper memory.

## RAM-Driven Performance

Now that you've started to manage your system's memory, you may want to use any extra XMS or EMS to increase the speed of your system. The two preferable ways to do this is with RAM disks and disk cache programs. Luckily, DOS 5 comes with one of each.

RAMDRIVE.SYS is a standard DOS 5 device driver that can create a disk drive using conventional, expanded or extended memory. The general form of



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loading RAMDRIVE.SYS is:

```
DEVICE=C:\DOS\RAMDRIVE.SYS ramsize [/e:/a]
```

The RAMsize is an integer value representing the size of the disk drive you want to create. If you want the RAM drive to reside in extended memory, specify /e. To use expanded memory for the RAM drive, use /a. If you specify neither, the RAM drive will be created in conventional memory, and this is probably not a good idea. Of course, you shouldn't specify both options in one statement.

RAM drives are beneficial when you have applications that are disk-intensive such as a sort utility. RAM drives also are useful when an application uses several overlays or constantly swaps code or data. They don't make as much sense when you have an application that doesn't use the disk a great deal, or when you can't afford to lose the contents of the drive. (The likelihood of a power failure or system crash seems to increase proportion-

**R**AM drives  
are beneficial  
when you have applications  
that are disk-intensivesuch  
as a sort utility

ally to the data on your RAM drives.)

You also can improve performance by using a disk caching utility like SMARTDRV in Windows 3.x. A disk cache is similar to a large disk buffer, and lets DOS perform larger and therefore fewer disk reads. A disk cache isn't as useful when an application is writing to the disk, because that happens immediately in case a power failure occurs.

In Windows 3.1, SMARTDRV.EXE

loads in AUTOEXEC.BAT; its general format is:

```
C:\DOS\SMARTDRV [max [min]] [/a]
```

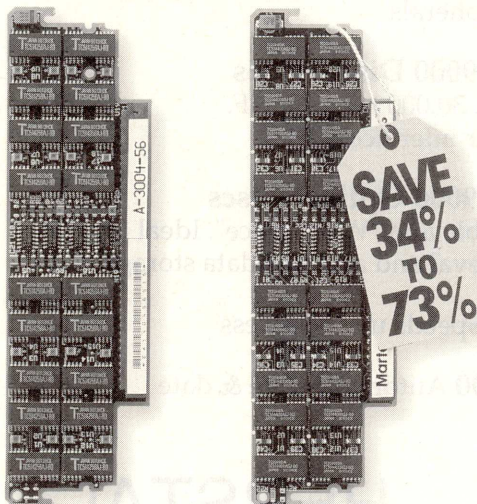
The max value specifies the maximum number of kilobytes used. If a value isn't specified, the default is 256 KB. The min value specifies the minimum number of kilobytes that SMARTDRV should retain. This value is important because Windows can reclaim memory from SMARTDRV down to this minimum value.

Finally, the /a switch causes SMARTDRV to be loaded into expanded memory; you probably won't do much of that on a 386 or 486.

Remember that the max value in SMARTDRV will decrease the amount of free extended memory. Be sure this value isn't too high or you may not be able to use any programs.

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## FYIMAIL/3000 Supports Carbon, Blind Messages

S.M. Gordon & Associates released version A.02.02 of FYIMAIL/3000. Along with the full screen editor included with the original package, the new version provides the ability to list and "tag" users to send mail, and supports both carbon copy and blind carbon copy messages. Up to 16 levels of security can be specified per message as well as a personal mail password that can be changed by the user. A conversion program from Whitman Mail also is included.

The new version supports printing to a

locally attached printer. Users now also can define and create their own template files that can be triggered in the mail system. FYIMAIL/3000 A.02.02 is priced at \$875.

Contact S.M. Gordon & Associates, 1302 Brewster Ave., Anaheim, CA 92801; (714) 522-6234.

**Circle 400 on reader card**

## GUI Builder Added To Supernova

Four Seasons Software announced a new graphical user interface builder, Supernova GUI Builder, for Supernova, the company's

flagship fourth generation application development tool. The company also announced Supernova version 3.1, which includes new database interfaces.

The Supernova GUI Builder is an add-on product to Supernova and uses MS-Windows and Motif widgets in applications built with Supernova.

Pricing for both products ranges from \$990 to \$108,000 and is based on the number of users and types of platforms.

Contact Four Seasons Software, Edison, NJ; (908) 248-6667.

**Circle 390 on reader card**

## HP Expands System And Server Lines

HP announced numerous additions and enhancements to its system and server product lines, including four new HP 3000s, a completely restructured HP 9000 server line, new intermediate packaging formats for both lines and a new integrated hardware and software solution package for several HP 3000 models.

The four new HP 3000 systems, intended to provide additional price points and greater flexibility for the overall HP 3000 line, include: the 947RX, 947RX, 957RX and 967RX. The RX systems, which use HP's double-wide (.4 meters by .4 meters) chassis, as opposed to the narrow-footprint (.2 meters by .4 meters) "LX" format, offer four I/O slots. They are positioned between the narrow LX two-slot package and the double-wide 12-slot chassis, which HP now refers to as its "SX" format.

The four I/O slots afforded by the RX systems provide users with greater flexibility to expand disk and storage requirements to better meet the needs of their organizations. For many of these users, the 12-slot SX chassis offers considerably more capacity than necessary, yet a two-slot LX system is not sufficient. Current LX system users who wish

Expansion Slots	tpsA	\$/tpsA	Price
<b>Model</b>			
<b>F Class — For small businesses/branch offices</b>			
F10	2	30.4*	\$11,014
F20	2	51.2*	8,718
F30	2	60.0	8,322
<b>G Class — For small businesses/large workgroups</b>			
G30	4	88.1	8,259
G40	4	110.5	8,075
G50	4	184.5	N/A
<b>H Class — For medium-sized businesses</b>			
H20	8	51.2*	10,106
H30	8	88.1	9,242
H40	8	110.5	8,479
H50	8	184.5	9,387
<b>I Class — For divisions in large companies</b>			
I30	12	88.1	9,794
I40	12	110.5	8,790
I50	12	184.4	9,946

\* Host-based configuration

**Pricing and disclosed TPC-A performance numbers for HP 9000 systems and servers.**

to take advantage of the new RX packaging can do so by means of a low-cost chassis upgrade.

Model	Price
<b>HP 3000 Plus packages based on RX models with four I/O slots:</b>	
HP 3000 Series 947RX Plus	\$143,000
HP 3000 Series 957RX Plus	158,500
HP 3000 Series 967RX Plus	178,500
<b>HP 3000 Plus packages based on SX models with 12 I/O slots:</b>	
HP 3000 Series 947SX Plus	154,500
HP 3000 Series 957SX Plus	175,000
HP 3000 Series 967SX Plus	195,000
HP 3000 Series 977SX Plus	231,000
HP 3000 Series 987SX Plus	301,000

## T A B L E 2

**HP Plus System pricing.**

Pricing for the new HP 3000 models is as follows: HP 3000 Series 937RX, \$33,500; HP 3000 Series 947RX, \$88,000; HP 3000 Series 957RX, \$103,500; HP 3000 Series 967RX, \$123,000. In addition to four I/O slots, the 947RX, 957RX and 967RX systems include the CPU, the MPE/iX operating system, a 100-user license, 64 MB of memory, 1-GB disk, 2-GB DDS/DAT tape drive and a terminal console. The less-expensive 937RX package includes the same features, but offers only a 32-user license and 32 MB of memory. Also included with all the new HP 3000 systems — and now available



## Cadshare Resources Enhances DECADE-UX

Cadshare Resources Inc. introduced DECADE-UX 2.01, offering increased productivity for users of System-5 UNIX-based hardware platforms, including all RISC workstations.

A C-based mechanical engineering package, DECADE-UX features a complete implementation of the OSF/MOTIF graphical user interface and X.11 windows technology. With version 2.01, frequently used commands such as cut and paste are now accessed on the screen instead of through

pulldown menus. Zoom functions have been expanded to include panning around a drawing, marking a particular view for later recall, placing a view in the center of a workfile and allowing all objects in the drawing to be viewed. Expanded dimensioning features include radii and diameters for circles and arcs.

The software interfaces with Oracle, Informix and Allbase SQL for relational database management and uses the family of



HP's EtherTwist Router. The EtherTwist Router increases the networking options available to users in open systems multiplatform environments.

### An Added Plus

In addition to the four new HP 3000 models, HP also enhanced its HP 3000 line with eight new integrated system offerings known as "Plus" packages. The new bundled packages include networking, performance-management, capacity-planning and high-availability/online-backup capabilities. Billed as "worry-free" computing solutions, HP 3000 Plus packages are designed for users who prefer the simplicity of one-stop shopping to the complexity of assembling and managing a multivendor open systems environment.

Each Plus package includes the basic HP 3000 system, featuring the standard memory, integrated disk storage, tape drive, operating

parts hierarchical structure. For CAM applications, DECADE-UX supports an interface into SmartCAM and Weber Systems. It also now can translate files to a PostScript format. Price is \$995.

Contact Cadshare Resources Inc., P.O. Box 11859, Charlotte, NC 28220-1859; (800) 633-7644.

**Circle 399 on reader card**

## Emulex Expands Printer Server Family

Emulex Corp. added NETJet to its printer server family. The interface board plugs into

system and user license, as well as the IMAGE/SQL database, an HP Vectra PC and a variety of network and system management tools. The inclusion of IMAGE/SQL in the Plus system packages marks a "rebundling" of the IMAGE database, which for many years was included with all HP 3000 systems but was changed to a delete option two years ago.

Among the included system and network management utilities are HP OpenView Console, a Windows-based application that runs on the Vectra PC, HP TurboSTORE/iX, a high-capacity online backup product, and HP AutoRestart/iX, an automatic restart application that requires no operator intervention. Plus systems also come equipped with Ethernet support over HP ThinLAN 3000/iX thin flexible cable. (See Table 2 for pricing information.)

Plus package users can also take advantage of the HP Vectra PC to integrate HP performance tools, such as HP LaserRX/MPE for performance data analysis, HP RX Forecast for capacity planning and HP GlancePLUS/iX for alleviating performance bottlenecks. Shipment of HP 3000 Plus packages will begin in the first quarter of 1993.

across the HP 3000 product line, is HP IMAGE/SQL — HP's new SQL-compliant version of its TurboIMAGE database. HP is presently shipping only the "read" interface portion of IMAGE/SQL, but a true "read/write" SQL interface for IMAGE is due out later this year. All HP 3000 models are currently shipping.

On the HP 9000 side, the addition of new packaging translated into four new classes of systems comprising 13 HP-UX servers. The four classes include: F Class low-end servers, which make use of the narrow chassis and offer two I/O slots; G Class mid-level servers for workgroups or small businesses, which use the double-wide chassis and offer four I/O slots; H Class medium-sized servers for large departments or mid-size companies, which also use the double-wide chassis, but offer eight I/O slots; and the I Class high-end servers for large divisions and companies, which use the double-wide chassis and offer 12 I/O slots. (See Table 1 for pricing information.)

Both the new HP 3000 and 9000 systems also come equipped with networking enhancements, including low-cost access to Frame Relay and Switched Multimegabit Digital service (SMDS) networks through



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## NEW PRODUCTS

LaserJet IIIsi printers and DesignJet plotters and connects to Novell Netware, UNIX and DEC environments.

The NETJet MIO interface card directly and simultaneously supports up to three of the most popular network protocols, Netware IPX/SPX, UNIX TCP/IP and DEC LAT. One or all network protocols can be enabled to provide unlimited and instantaneous multiple host, multiple vendor, multiple protocol and multiple user connectivity. The NETJet can be ordered with one or more protocols and is user upgradeable to all three.

The NETJet uses standard Novell Netware IPX/SPX remote printer support, RFC-compliant TCP/IP, UNIX "lpd," and DEC LAT protocols, so no special software is required on host computers, and application programs can run without modifications. Introductory pricing is based on protocol supported.

Contact Emulex Corp., 3445 Harbor Blvd., P.O. Box 6725, Costa Mesa, CA 92626; (714) 662-5600; (800) 854-7112.

CIRCLE 398 ON READER CARD

### Software Moguls Adds Speed To SM-arch Version 3.0

Software Moguls Inc. introduced a new version of SM-arch, its network backup and extraction software system designed for HP 9000 Series 700 HP-UX systems.

Version 3.0 supports the HP-UX series as both clients and servers and provides support for optical jukebox hardware. The new version also supports remote backup devices, with multiple simultaneous backups through single point control, improving performance through the reduction in network traffic and the load on the single backup server. The features permit large networks to realize the capabilities of jukeboxes that hold as many as four tape drives.

Contact Software Moguls Inc., 12301 Whitewater Dr., Ste. 160, Minnetonka, MN 55343; (612) 933-8790.

CIRCLE 392 ON READER CARD

### Momentum Software Adds AIX/ESA Support To XIPC

Momentum Software Corp. announced that support for IBM's AIX/ESA mainframe UNIX operating system has been incorporated into XIPC version 2.4.

XIPC is a Distributed Application Development ToolSet that applies the standard mechanisms for multitasking IPC

found in various forms in UNIX, IBM OS/2 and DEC VMS and makes them completely network and operating system transparent. AIX/ESA is built on the Mach kernel from OSF and offers UNIX on the ES/9000.

XIPC offers a single API for developing both intranodal and internodal applications, which is identical across all supported platforms. Now distributed applications can be developed and deployed on and across AIX/ESA, AIX/RS6000, HP-UX and many other platforms. XIPC offers all of the standard available IPC mechanisms. XIPC with AIX/ESA support is priced from \$46,200.

Contact Momentum Software Corp., 401 South Van Brunt St., Englewood, NJ 07631; (201) 871-0077.

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### Sterling Software Announces GENTRAN For UNIX

Sterling Software Inc.'s ORDERNET Services introduced its GENTRAN for UNIX Electronic Data Interchange (EDI) software. GENTRAN for UNIX provides a range of EDI management and translation functions plus an optional communications module. EDI is the business-to-business exchange of formatted documents between computer applications.

GENTRAN for UNIX offers EDI management software for the HP 9000 and IBM RS/6000 platforms. It supports all major global EDI standards, subsets and transactions plus many industry-specific versions. It features an on-line, menu-driven mapping integration system and a job scheduling feature that provides procedures for translation, communications and application interfaces which facilitate unattended operation. The on-line audit system provides immediate feedback, interactive query, document tracking and reconciliation of functional acknowledgments.

Contact Sterling Software, 4600 Lakehurst Ct., P.O. Box 7160, Dublin, OH 43017-0760; (614) 793-7000.

CIRCLE 331 ON READER CARD

### UniPress Offers XView Toolkit Version 3.0

UniPress Software Inc. announced version 3.0 of the XView Toolkit for HP 9000 Series 700/800 computers.

With the XView Toolkit, XView 3.0



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## NEW PRODUCTS

applications that already run on Sun workstations can be moved to the HP platforms by recompiling the application source code, and new XView applications may be developed with the Toolkit's suite of object-oriented tools.

New features supported in version 3.0 include drag-and-drop, multilanguage capabilities and overall enhanced reliability and performance. The XView package includes the XView 3.0 libraries, OPEN LOOK Window Manager, a number of XView applications, SunView-to-XView conversion tools and Lucida fonts. A single CPU development license is \$2,495. A one-time additional charge of \$7,500 permits the developer to bundle an application with XView for unlimited distribution.

Contact UniPress Software, 2025 Lincoln Hwy., Edison, NJ 08817; (908) 287-2100.

**Circle 396 on reader card**

### **Visix Software Upgrades Looking Glass Professional**

Visix Software Inc. announced the availability of Looking Glass Professional 3.0 desktop manager for UNIX workstations and X terminals.

Built using Visix's Galaxy Application Environment, it is an icon- and mouse-driven interface for UNIX that allows the user to select the look and feel they prefer at runtime — OPEN LOOK, Motif or Presentation Manager. New features include an Icon Bar that appears in the Desktop Window to allow users to invoke commands or launch applications by clicking a button rather than selecting from a menu. It also provides an intelligent drag-and-drop functionality and follows the OSF/Motif style guide, Open Windows DeskSet and X Consortium ICCCM protocols. It is priced at \$795 for a one-user license.

Contact Visix Software Inc., 11440 Commerce Park Dr., Reston, VA 22091; (703) 758-8230.

**Circle 393 on reader card**

### **MJM Software Launches USL's MoOLIT**

MJM Software announced MoOLIT for HP, Sun, IBM and DEC workstations. MoOLIT (Motif OPEN LOOK Intrinsic Toolkit), developed by UNIX System Laboratories, is the newest release of OLIT that supports both the OPEN LOOK and Motif GUIs.

MoOLIT's API is a superset of the pre-

vious release, OLIT 4i, and includes the ability to dynamically switch the OPEN LOOK and Motif look and feel, internationalization, a drag-and-drop interface compatible with Sun OpenWindows 3.0, improved performance, new high functionality widgets and new geometry management internals. The product is available in several configurations for the developer, end user and software reseller. The developer copy is priced at \$2,495.

Contact MJM Software, 17 Clyde Rd., Ste. 202, Somerset, NJ 08873; (908) 873-0075.

**Circle 394 on reader card**

### **CSTAR Unveils PLOT3D Version 3.6 Plus**

The Center for Space Transportation and Research (CSTAR), a joint operation of Calspan Corp. and the University of Tennessee, announced an advanced version of the visualization and display software program, PLOT3D Version 3.6 Plus for HP 9000 Series 700 workstations.

Originally developed by NASA, PLOT3D is a graphics program designed for the visualization and display of three-dimensional flowfields. It allows functions of flowfield variables to be displayed as contour plots, vectors and particle traces. Grids may be displayed as wireframes or as solid surfaces. The graphical image may be viewed in perspective or orthogonal projection from any viewpoint. An unlimited site license is available for \$2,000.

Contact CSTAR, UTSI Research Park, Tullahoma, TN 37388-8897; (615) 455-5884.

**Circle 389 on reader card**

### **QA Administer Manages Large Software Projects**

Programming Research announced QA Administer, a single automated system providing Configuration Control, Change Control and Quality Control on HP, IBM, DEC and many other platforms. Providing built-in quality assurance procedures demanded by ISO9001 and TQM initiatives, QA Administer provides project managers and developers with an automated tool to manage large software projects.

It allows modifications to software programs to be carried out without error as any changes to the source must be justified, recorded and tested. This enables managers and developers to monitor the status of each



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Compuserve/Collier Jackson serves as a Hewlett-Packard Premier Solution Provider for the HP 3000 Series of midrange computers. Its products include financial accounting and human resource management systems for cross-industry business applications as well as newspaper systems for circulation, business and advertising management. Direct inquiries to: Gary Vigneau, vice president of sales and marketing at *(813) 872-9900 or circle 111.*

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Contact Programming Research Corp., P.O. Box 4468, Silver Spring, MD 20914; (301) 949-2751.

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## Multiview Upgrades Financial Software

Multiview Corp. completed an upgrade of the Multiview Financial software line for the HP 3000 environment. The software runs under both the MPE XL and MPE V operating systems.

The enhanced line of financial and procurement products encompasses 81 new features and product improvements, including enhancements in the areas of financial inquiry, reporting and analysis; tax processing and reporting; ease of use; implementation and maintenance; and interfaces to other systems. The family of Multiview Financial Software includes Multiview General Ledger, Multiview Accounts Payable, Multiview Purchase Order, Multiview Accounts Receivable, Multiview Fixed Assets, Multiview Commitment Accounting, the advanced Drill-Down inquiry feature, and the MultiLink desktop-to-host link.

Customers with current Multiview support agreements receive the upgrade at no cost. New customers may license individual products for fees ranging from \$10,000 to \$98,000, depending on the application. Contact Multiview Corp., One Van de Graaff Dr., Burlington, MA 01803-5171; (617)-229-2225.

**Circle 332 on reader card**

## Cortex Delivers CorVision Version 5.0

Cortex Corp. announced CorVision version 5.0, an application development tool that automatically generates full-scale, commercial production applications designed to run in an open systems environment. The new version will allow users to develop terminal/host applications to run on a variety of UNIX operating systems, including HP-UX, by generating applications in ANSI C source code.

In addition, version 5.0 applications are implemented using industry standards such as IEEE POSIX and SQL. Version 5.0 also can use such runtime data managers as RMS, Rdb Oracle, Sybase, C-ISAM, VAX DBMS and proprietary data managers.

Version 5.0 is the first element in the company's open systems architecture strategy

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called Series 5. The goal of Series 5 is to ensure that CorVision customers easily can incorporate new open systems technology into their applications.

Contact Cortex Corp., 100 Fifth Ave., P.O. Box 9097, Waltham, MA 02254-9097; (617) 622-1900.

**Circle 391 on reader card**

## NIS Ships ACCENT GraphicVUE For UNIX

National Information Systems Inc. (NIS) announced the ACCENT GraphicVUE Project Management system for UNIX-based, open systems environments, including the HP 9000 Series 700 workstations running HP-UX version 8.05 or greater.

GraphicVUE version 1.0 features interactive spreadsheet, PERT, and Gantt diagrams to give users on-screen visualization of the entire project. Other features include mouse-driven, Motif-based GUI with intelligent zoom and color selection, multiple project scheduling, cost and resource roll-ups across projects, hammocking function for single and multiple project summaries,

baseline time/cost comparisons, resource grouping and leveling, backward scheduling, time-scaled network diagram, multiple calendars, and user-defined work breakdown structure codes.

GraphicVUE is priced at \$2,950 for the first floating single-user license on the network or standalone workstation. User licenses two through five are priced at \$1,750 each. Licenses six and above are priced at \$1,250 each. Node-locked licenses for a single workstation in the network are \$1,450 each after the first floating license is purchased. Contact NIS, 4040 Moorpark Ave., San Jose, CA 95117-1852; (800) 441-5758; (408) 985-7100.

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## Contemporary Cybernetics Expands Tape Backup Family

Contemporary Cybernetics Group announced the addition of two half-height 8 mm tape drives to its tape backup family.

The CY-8205 can store between 2.5 GB and 12.5 GB at speeds of up to 1.3 MB per second. The CY-8505 can store between

5 GB and 25 GB at speeds of up to 2.5 MB per second. The high capacity and speed can be attained by utilizing the drive's built-in data compression, which can increase tape capacity by up to five times. Data compression is switch selectable, so users can read and write tapes without data compression for compatibility with other sites. The CY-8205 and CY-8505 are plug-compatible with HP, DEC, IBM and many other systems. Contact Contemporary Cybernetics Group, Rock Landing Corporate Center, 11846 Rock Landing, Newport News, VA 23606; (804) 873-9000.

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## HotKey B.03.00 Features New Installation Procedure

Riviera Software announced version B.03.00 of its HotKey3000 application switcher, which allows users to switch between programs instantly without logging on and off. The new version includes a new installation procedure and a new windows-oriented interface called NewLook(c).

With the new installation procedure, it is

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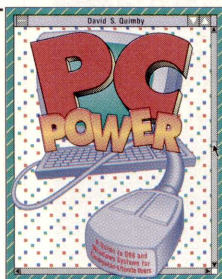
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now possible to install users' applications under HotKey without having to stop the system. HotKey does not alter any SL or XL and applications do not have to be modified.

NewLook(c) allows users to build the HotKey interface with users' applications quickly and without the need to refer to any

documentation. HotKey accomplishes this with a PC look-alike interface consisting of menu bars, pull-down and pop-up menus and windows.

HotKey is now fully compatible with all windows-oriented products such as ASK 8.2, Cognos 8.17 and Speedware. Also, HotKey

B.3.00 is now compatible with Vesoft's Security menu.

Contact Riviera Software, 7901 Havenwood Dr., Austin, TX 78759; (512) 346-0962.

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### Cincom Announces UNIX CONTROL:Manufacturing

Cincom Systems Inc. announced CONTROL:Manufacturing on UNIX, a major piece of its open systems strategy for CONTROL:Manufacturing.

CONTROL:Manufacturing is a comprehensive business system that includes integrated support for manufacturing, distribution and financial management. It is available for HP 9000 series computers with HP-UX. It also will be available for DECsystems with Ultrix and Digital Alpha systems.

This new generation of manufacturing software incorporates industry standards for open systems in the areas of user interface, data management, communications and computing platforms. It also utilizes client-server computing and provides distributed, multisite implementation options. Technologies will include graphical user interfaces, SQL RDBMS and 4GL tools, electronic data interchange and support for multiple UNIX platforms.

Contact Cincom Systems Inc., 2300 Montana Ave., Cincinnati, OH 45211-3899; (513) 662-2300.

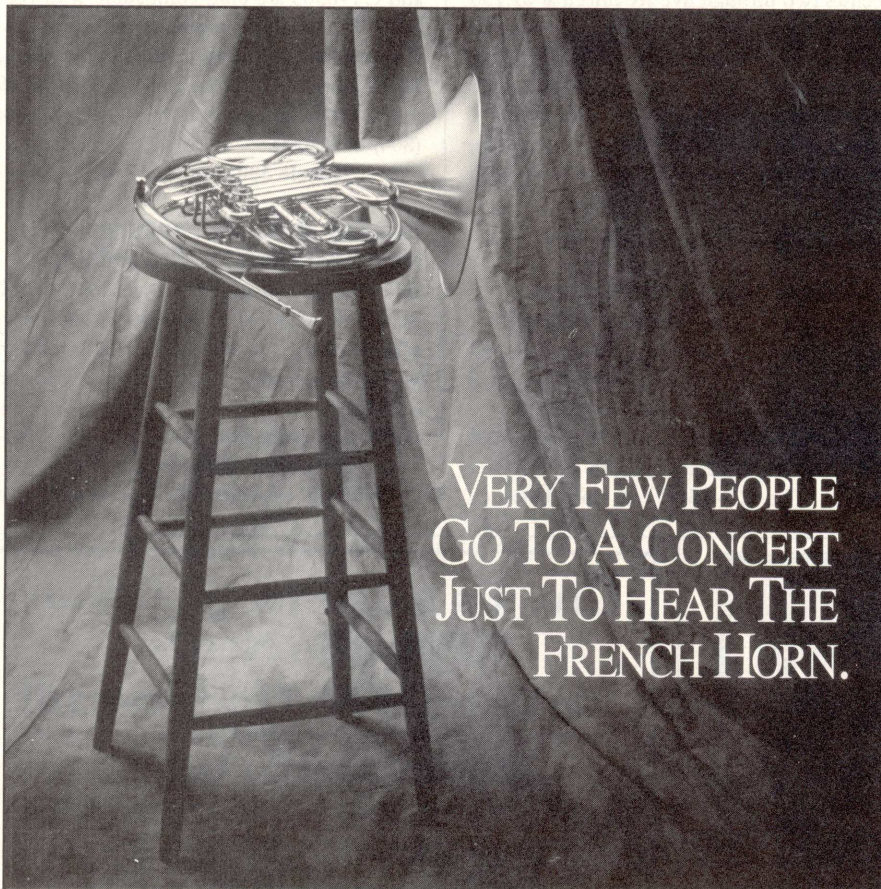
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### Spectra Logic Debuts Alexandria

Spectra Logic released the Alexandria Backup and Archive Librarian, a comprehensive UNIX software package designed to manage data on automated media changers.

Alexandria supervises every facet of backup and archival storage from automatically starting scheduled store operations to managing data, media, storage devices and device maintenance across an entire network. Alexandria's scheduler can supervise an unlimited number of full backups, incremental backups and restores. Files can be included or excluded by pattern, user, group or date; repeats can be specified by hour, day, date, day of week, month or year.

Alexandria includes the X-11/Motif interface, which provides pull-down menus and graphical intuitive access to all users, and a command line interface that provides



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scripting capabilities as well as access from text-only terminals, allowing the experienced UNIX user to access system-level commands. Prices range from \$200 to \$12,000.

Contact Spectra Logic, 1700 North 55th St., Boulder, CO 80301; (303) 449-7759.

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### **ACE/SERVER Offers Slave Server Option**

Security Dynamics Inc. (SDI) announced version 1.1 of its ACE/Server network security product, which authenticates a user's identity and allows only authorized users to gain access to a protected network.

The new version offers security administrators the option of running a backup or slave ACE/Server, which would process authentication requests and maintain an audit trail of all security-related activities if the master server were to malfunction or cease to operate. The level of security is further enhanced by having all data communications between master and slave encrypted in varying time sequences, thereby eliminating the possibility of unauthorized tracking of encrypted information. Administrative operations also have been streamlined.

Supporting TCP/IP networks, the ACE/Server operates in HP-UX, SunOS, DEC Ultrix and IBM RS/6000 AIX server environments.

Contact Security Dynamics Inc., One Alewife Center, Cambridge, MA 02140-2312; (617) 547-7820.

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### **PodiumPal Assists Public Speakers**

Sparcom Corp. announced PodiumPal speech software for the HP 95LX.

With PodiumPal, the speaker can create up to 12 notecards of titles and body text per speech. Each notecard can handle from six to 10 lines of copy depending on font size. A built-in clock features a countdown for the length of the presentation and ticks off time for each notecard. There is a warning flashed at the appropriate time to focus the speaker to begin the conclusion. An added feature is the Quotes directory, with more than 100 famous quotations from Winston Churchill, Will Rogers and others, filed under different categories such as experience, future, health, hope, etc.

A step-by-step guide to public speaking is included. PodiumPal is priced at \$89.95.

Contact Sparcom Corp., 897 NW Grant Ave., Corvallis, OR 97330; (503) 757-8416.

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### **Systems Union Introduces Version 4.0 of SunSystems**

Systems Union introduced version 4.0 of its SunSystems accounting and financial management software with a new graphical user interface that runs in both Windows 3.1 and OS/2 2.0 environments.

Windows and OS/2 users operating SunSystems version 4.0 accounting modules with enhanced international reporting and analysis, multiple currency and multiple language capabilities can perform multitasking and run multiple screens with drop-down menus. Also, SunSystems has interoperability across all major platforms, such as HP 9000.

SunSystems version 4.0 also has a new corporate allocations module and offers extensive enhancements to its sales order processing, purchasing and inventory modules.

Contact Systems Union Inc., North American Headquarters, 10 Bank St., White Plains, NY 10606; (914) 948-7770.

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### **VCS/3000 Works With MPEX/3000, SECURITY/3000**

Version Control System/3000 (VCS/3000), a product developed by Diamond Optimum Systems Inc., now works together with VESOF's MPEX/3000 and SECURITY/3000.

VCS/3000 transfers files between production, development and test areas on the HP 3000, eliminating conflicts between multiple programmers working concurrently on the same files. The files can be transferred by VCS/3000 either on line or in batch using VESOF's STREAMX program to launch job streams. This feature, part of SECURITY/3000, eliminates the need to store MPE passwords in the VCS/3000 database and can be enabled by patching the VCS/3000 main program with either STREAMX.PUB.VESOF (MPE V compatibility mode) or STREAMNL.-PUB.VESOF (MPE/iX native mode).

Contact VESOF, 1135 S. Beverly Dr., Los Angeles, CA 90035; (310) 282-0420.

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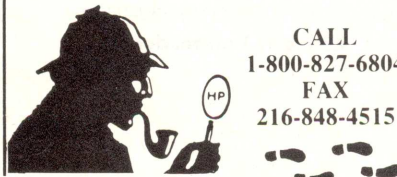
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## COMING IN APRIL...

### Editorial Focus — Workstation Graphics

#### Scheduled Features\*:

■ **Multimedia: The Future Is Now** — HP's new MPOWER multimedia software now allows multiple users to share a single X Window workspace, send video- and voice-annotated messages or integrate fax, scanned images and other media in desktop applications.

■ **Interface Builders: A Window Of Opportunity** — Thanks to interface design tools and user interface management systems, it's become easier to migrate applications to new platforms. From MAC to Motif, from OpenLook to Microsoft Windows — it can be done.

■ **Visualization For All** — As workstations become more powerful and sophisticated graphics capabilities become less expensive, graphical representation and analysis of statistical data are becoming increasingly commonplace. Lynn Haber looks at scientific visualization and visul data analysis tools in the HP market.

**SPACE CLOSING: 3/8**

**MATERIALS DUE: 3/15**

\*Articles subject to change.

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**Gordon  
McLachlan**

# Compulsive Computing

I think I'm on the leading edge of an emerging social

trend: computer-dependency. It hasn't made the rounds of the talk-show circuit yet, but it will. Here's my sordid story.

I never had contact with computers or people who used them until I went away to college. During my junior year, after settling on economics as an easy degree program, and a plausible excuse to stay in school until I was 30-something, I decided it would be a good idea to get some programming under my belt so I could work on the computerized econometric models then considered research centerpieces at my university.

Soon I found that I liked computers a lot more than anything else I was doing. First I coded a little FORTRAN. Then I tried some PL/1. Before long, I was hacking away in Algol and even tried some SNOBOL and APL, just to see what they were like.

I started to spend so much time at the computing center that I began to work as a computer counselor, helping other students with their coding problems. At this point, I was spending my free time *and* my work time at the center. Eventually, I began to cut class to hang out there, too.

By now, I had given up all thoughts of pursuing anything except being a computer jockey. I thumbed my nose at a government internship, and got a co-op position with a computer manufacturer. I was in heaven. I had all the computer time I could want. If I was willing to work those vampire hours, I could have a whole mainframe to myself. The power was intoxicating.

I remained with the vendor for more than six years, grubbing in operating system code, immersing myself in docu-



mentation and wallowing in memory dumps. It was all still under control, or so I thought. The computers were at work, and when I was home I could forget about them. Sure, I'd bring a little documentation home to read now and again, but it wasn't like I was doing it all the time.

## PCs: The Slippery Slope

Then I left the vendor to become a planning manager for one of my customers. Suddenly, I wasn't doing any coding, or much in the way of the heavy technical stuff. My first year I wrote a grand total of 200 lines of COBOL code and read a lot of magazines. Then I discovered PCs.

At first it was just the applications. Spreadsheets, word processors and databases. I wrote a few macros, but nothing heavy. Then I got a PASCAL compiler and I started to write code. Soon, my Vectra didn't thrill me the way it used to, so I bought a 386/33 PC clone. I wrote 20,000 lines of PASCAL code in what was left of my rapidly disappearing free time. Then I got into object-orientation and bought a C++ compiler.

By this time, my writing assignments started to take off, so I signed up for CompuServe for research material. Then

I joined BIX, and tried a couple of other information services. Soon, I was blowing more on phone bills and on-line service charges than I was spending on my car payment.

As long as what I was doing was work-related, I thought it was under control. But working full-time as a consultant and more than part-time as a freelance author, I could spend 16 or more hours a day in front of a PC. At first, my wife was tolerant because it was paying the bills, but my PC abuse was starting to take its toll on the family.

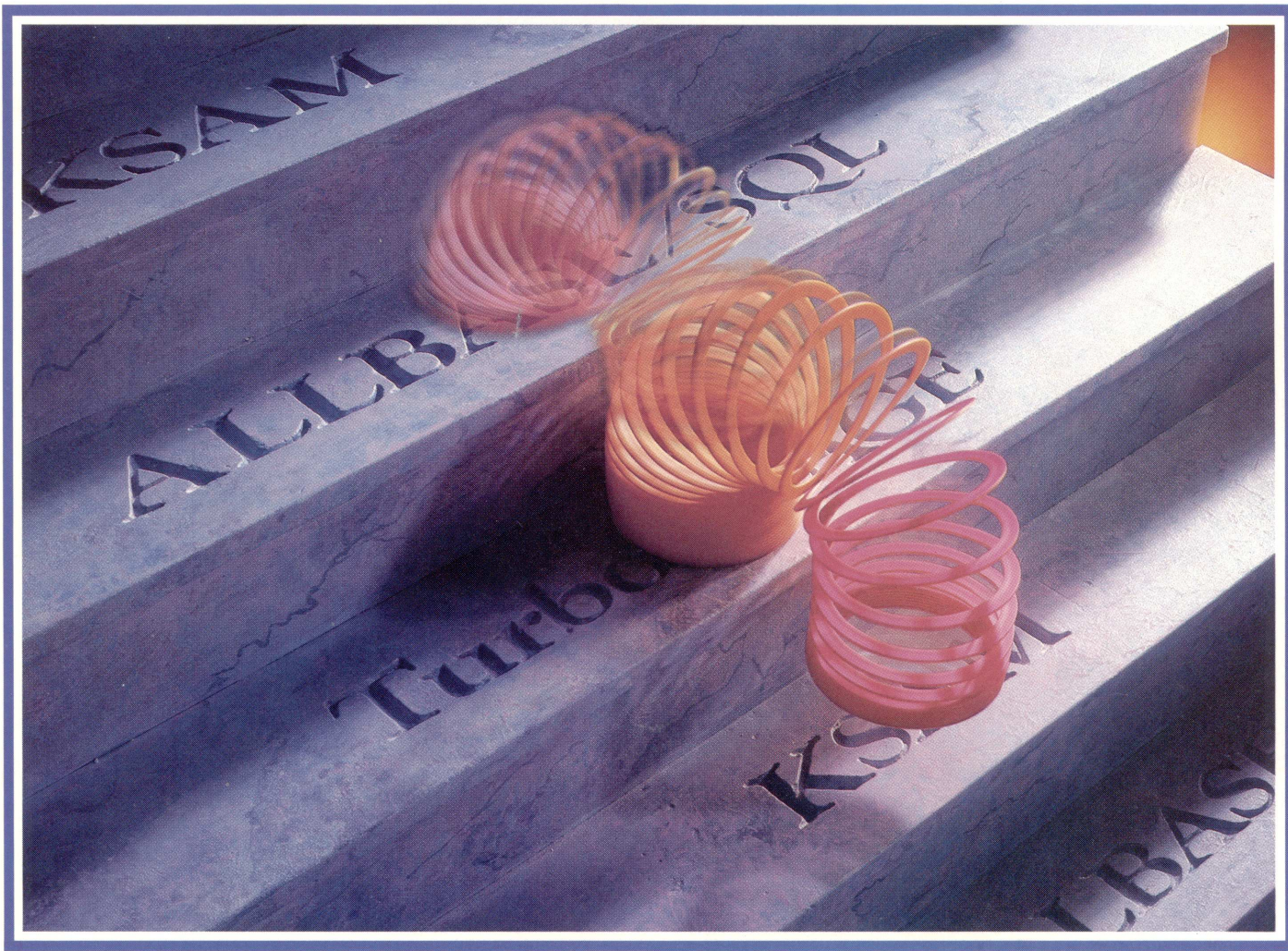
Starved for human companionship, my wife started to exchange E-mail with a few friends using an old PC/XT she dragged home from the office. One thing led to another, and she found out she had access to the Internet. Then, she started to hang out on sci-fi bulletin boards that offered low-tech "virtual reality" and developed a cyberpunk alterego. Soon she was regularly putting in three or four hours on-line. She stopped complaining about my machine time as her own use climbed, and the kid had to start hunting both of us down.

Finally, I'd hit rock bottom. I had to go to San Francisco without my laptop, because it took more than a month to get it repaired and upgraded, and the week free of a PC cleared my senses. When I returned home and saw my son conversing with his mom and her cyber-friends via bulletin board, my heart almost broke. When he asked me for his own computer for Christmas, I realized that the poor little 6-year-old was following his parents on the road to hell — and he was getting a 15-year head start.

Many people worry about the effects of sex, drugs and rock-and-roll on our youngsters. To this I can only add: Mamas, don't let your babies grow up to be computer jockeys. ■



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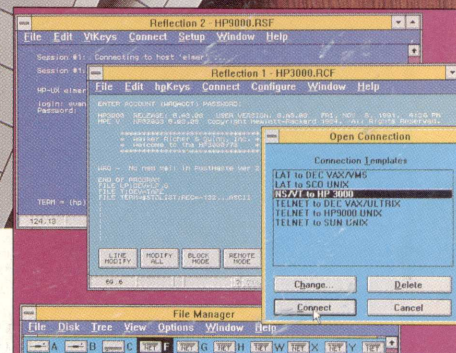
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